MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
MODEL ANSWER SET FOR SEMESTER END THEORY EXAMINATION
B. Sc. (Hons.) Agri.

Semester	: I (New)	Academic Year	: 2022-23
Course No.	: H/Hort-111	Title	: Fundamentals of Horticulture
Credits	: 2 (1+1)	Total Marks	: 40
Day & Date	:	Time	:

SECTION "A"

Q.1 Describe importance of horticultural crops in India and future opportunities. (4M)

Ans. Horticulture is defined as the crop science which deals with the production, utilization and improvement of fruits, vegetables, ornamental plants, spices and plantation crops, medicinal and aromatic plants.

Importance can be described under following heads

- ✓ Nutritional importance
- ✓ Medicinal importance
- ✓ Income generation
- ✓ Land utilization
- ✓ Employment generation
- ✓ Industrial development
- ✓ Religious and sacred value
- ✓ Aesthetic value
- ✓ Export value

Opportunities

- ✓ To increase an area and production
- ✓ Irrigation facilities
- ✓ Scope to increase transport and market facilities
- ✓ Cold storage and preservation industries.
- ✓ To use advanced techniques
- ✓ Rejuvenation and scope for nursery plants.
- ✓ Cooperative societies establishment

Q.2 Write the different criteria of classification of horticultural crops with examples. (4M)

Ans. 1. Classification based on plant part used for consumption or any other purpose – fruit plant, vegetable, ornamental or floriculture crops.
2. Classification based on duration of life annual, biennial and perennial.
3. Based on climatic requirement. Temperate, sub tropical and tropical.
4. Based on tolerance of relative humidity, humid, semi arid, arid
5. Based on water requirement.
6. Based on light requirement.
7. Based on photoperiodic requirement.
8. Botanical classification.
9. Based on season of growing.

(suitable example of crops be given with each class)

Q.3 **Differentiate between training and pruning and explain in brief open centre system of training.** (4m)

Ans.

Training	Pruning
1 Mainly concerned with giving a form or shape to the plant.	1 Pruning has an effect on the function of the plant.
2 It determines the general character and even details of the plants outline and its branching and frame work.	2 Pruning is meant to assist more in determining what the tree does in respect of fruiting.
3 When the plant is tied, fastened, staked or supported over a trellis or pergola in a certain fashion or some of its parts are pruned with a view to give the plant a frame work, the operation is called training.	3 Pruning is the art of removing, scientifically certain portions of a plant with a view to produce more and superior quality of fruit. According to severity of pruning, nutritive conditions within the tree changes and consequently limits or encourages fruit bud formation.

Open centre system of training : In open centre system of training the main stem is allowed to grow only upto a certain height by heading it within an year of planting of the tree and inducing all subsequent vegetative growth by lateral branches. This results in a low head in which the bulk of the crop is borne closer to the ground than in case of central leader tree. Open centre system allows full sunshine to reach each branch. Such trained trees are more fruitful and also greatly facilitate operations like spraying, thinning and harvesting.

Q.4 **Write short notes on (Any two)** (4m)

1. Hexagonal system of planting 2. Spices and condiments 3. Bahar treatment.

Ans.

1. **Hexagonal system of planting** – The tree is planted at the corners of equilateral triangles and thus six trees from a hexagon with 7th tree in the centre. This system is generally followed where land is very fertile with ample provision of irrigation water. About 15% more plants can be planted per unit area by adapting this system. However it is difficult to layout and cultivation in plot can not be done so easily as in square system.

2. **Spices and condiments:** Spices are those plants, the products of which are made use of as food adjuncts to add aroma and flavour (ex. Pepper, Cardamom, Clove, Nutmeg etc), while condiments are those plants, the products of which are used as food adjuncts to add taste only. Both spices and condiments contain essential oils, which provide the flavour and taste. They are of little nutritive value. They are used as whole, ground, paste or liquid form, mainly for flavouring and seasoning food. Most spices increase the shelf-life of food.

3. **Bahar treatment** – Induction of flowering by reducing vegetative growth and giving induced rest which is achieved by withholding, irrigation is called bahar treatment. In this treatment the trees after harvest of the fruits are subjected to moisture stress from they may be released either by the irrigation or with commencement of mansoon rains. The duration of water stress depends up on soil type and season. e.g., Mruga bahar – Rest is induced in the month of May by withholding water harrowing and cross harrowing be done encourages CCC / NN condition in plant then fertilizers are applied

and tree put forth new vegetative growth along with flowers with commencement of mansoon eg., guava citrus.

Q.5 Define unfruitfulness and write in short about factors leading to unfruitfulness. (4M)

Ans. Definition -- Tree produces abundant blossom but there is no fruiting at all this phenomenon is called unfruitfulness.

Internal factors a) Evolutionary factors b) Genetic factors c) Physiological factors

External factors a) Environmental factors b) Biological factors c) Cultural factors d) Nutritional factors

Explain each factor in short.

Q.6 Describe nutritive value of fruits and vegetables in human diet.

Ans. From human nutrition point of view horticulture is most important to our daily living. Many of the horticulture crops and their products find place in our meals and diet. Human body requires vitamins, minerals, proteins, energy etc, for its health. All these are supplied by horticultural crops. Fruits and vegetables are the chief sources of vitamins, minerals, carbohydrates, fats, proteins etc. Fruits and vegetables are recognized as protective foods as they are necessary for the maintenance of human health

Elements / vitamins their deficiency symptoms and availability source.

1. Calories and proteins: Retarded growth, retarded mental development, irritation of skin discoloration of hair, swelling of face and lower body parts.

Source – Sapota, banana, avocado, dates

2. Vitamin A: Deficiency symptoms – Night blindness, sore eyes, susceptibility to respiratory and digestive track infections, rough skin in children. Source – mango. papaya, carrot, peas, tomato, green chilli, cabbage, sweet potato.

3. Vitamin B1: Deficiency symptoms – Beriberi, paralysis and loss of sensitivity of skin. Source – Cashewnut, almond, walnut, banana, dates, green leaves, cabbage, lettuce. carrot, onion.

4. Vitamin B2 : Deficiency symptoms – loss of weight, lack of appetite, sore throat. cataract. Source – bael, papaya, cashewnut, pineapple, amaranthus, green chilli. cauliflower, knolkhol.

5. Vitamin C: Deficiency symptoms – Scurvy, bleeding gums, rheumatism, damage to heart muscles, susceptibility to diseases.

Source – West Indian cherry, aonla, guava. citrus, pineapple, cabbage, lettuce, tomato. chilli, other green vegetables.

6. Vitamin D: Deficiency symptoms – Rickets. Source – Green vegetables

7. Vitamin E: Deficiency symptoms – Sterility. Source – Leafy vegetables, vegetables oils.

8. Calcium: Deficiency symptoms – Rickets, osteomalacia, pigeon chest, retarded growth. Source – Lemon, custard apple, almond, beans, cabbage, carrot, onion, peas. beans.

9. Iron: Deficiency symptoms – Anemia, spoon shaped nails, frequent exhaustion. Source – karonda, guava, grape, dates, cabbage, peas, beans, tomato.

Q.7 Define plant growth regulators and explain their role in growth of horticultural crops. (4M)

Ans. Plant growth regulators or plant regulators are the organic compounds other than

nutrients which modify or regulate physiological processes in an appreciable measure in the plants when used in small concentrations. They are readily absorbed and these chemicals move rapidly through the tissues when applied to different parts of the plant. Auxins, Gibberellins and cytokinins are Growth promoters and Ethylene and Abscisic acid are growth inhibitors. Growth Retardants: These are chemicals which have common physiological effect of reducing stem growth by inhibiting cell division.

Uses – Auxin – Root induction, weed control, control of fruit drop, regulation of flowering.

Gibberellin- Seed germination, flowering, parthenocarpy, fruit setting breaking of dormancy fruit thinning, extending shelf life.

Cytokinine – Fruit ripening, flowering, growth.

Ethylene - Fruit ripening, flowering, growth.

Abscisic acid -- Induction and maintenance of dormancy, germination, help during water stress.

(4M)

Q.8 Write short notes on (Any two)

1. Intercropping 2. Medicinal and aromatic plants 3. Pollinizers and pollinators

Ans. 1. **Intercropping** – Growing of two or more crops in same field at same time. Quick growing horticultural crops or field crops are grown as intercrops – Merits vacant spaces between fruit trees is utilized – economic use of land, checks soil erosion, adds organic matter, check weed growth and has beneficial effect on main crop. Demerits – More labours, high input cost more incidences of insect pests.

2. **Medicinal and aromatic plants** – It deals with the cultivation of medicinal plants, which provide drugs and aromatic crops which yields aromatic (essential) oils.

Medicinal plants- are those plants, which are rich in secondary metabolites and are potential sources of drugs. The secondary metabolites include alkaloids, glycosides, coumarins, flavonoides and steroids etc. e.g. Periwinkle, Opium, Menthi, Cinchona, Dioscorea Yam, Belladona, Senna, Sarpagandha, Aswagandha, Tulasi etc.

Aromatic plants- are those plants, which possesses essential oils in them. The essential oils are the odoriferous steam volatile constituents of aromatic plants. e.g. Lemon grass, Citronella, Palmrosa, Vetiver, Geranium, Davanam, Lavendor etc.

3. **Pollinizers and pollinators** - Pollinator refers to the pollinating agency which carries pollen from anther to the stigma. Insects and wind are two most important pollinators in fruit crops. Wind pollinated types are called anemophilous and insect pollinated are called entomophilous. Among insects, honey bees who visit the flower for nectar and pollen grains affect pollination in many fruit crops, though house flies does affect pollination in mango. In case of cross pollinated species, pollinizer and pollinator are of utmost importance, otherwise nothing is produced. If adequate provision of pollinizer and pollinator is made and other factors remain favorable, fruiting is possible. Therefore it is always advised to keep honey bee boxes in the cross pollinated crops.

Pollinizers: Sometime certain cultivars produce non-viable pollen grains (sterility) or pollen is not able to affect fertilization (incompatibility). Dushehri, Langra and Chausa mango are self-incompatible. Most apple cultivars are self-incompatible. JH Hale peach and Bartlett and Kieffer pear are self-sterile. Under such situations another pollen source/cultivar interplanted in the orchard which produces viable pollen and is compatible with the main cultivar can cause fruit set, they are called as pollinizers. Thus

adequate provision of pollinizer is necessary for making the main cultivar fruitful. Provision of pollinizer can be done by different methods i.e. interplanting, bouquet method, grafting method etc.

Q.9 Why selection of site is essential and criteria for selecting the site of an orchard. (4M)

Ans. Selection of Site: Selection of site is permanent importance in fruit industry the fruit plants are of a permanent in nature and mistakes commited in the outset are difficult to rectify at the later stage.

An orchard is a long term investment and deserves a very careful planning and organization. Any mistakes made initially in the selection of location, site, planting distance, soil, climate, irrigation facilities, varieties and nursery plant material used, considerably reduce the returns on investment.

It is therefore advisable to seek expert guidance of an experienced fruit grower before starting the enterprise.

Factors to be considered while selecting the site for fruits.

1. Climate and soil 2. Transport facilities 3. Irrigation facilities 4. The site should not be close to any diseased plantation or must be isolated from old plantation. 5. Cheap man power 6. Owner's house 7. The selected site should be free from cyclones, frost, hails and storms, strong and hot winds 8. Market: closeness to the market

Q.10 **Classify different irrigation methods used for horticultural crops. Explain drip irrigation.** (4M)

Ans. 1. Surface irrigation methods are a. Flood irrigation b. Bed irrigation c. Flat beds d. Raised beds e. Basin irrigation f. Double ring system g. Ridge and furrow system. i. Serpentine method

2. Subsurface irrigation

3. Overhead irrigation or sprinkler or boom irrigation

4. Drip irrigation or micro irrigation.

Drip irrigation: Modern drip irrigation, supplies the filtered water to the plants through an extensive pipe network. Water is neither spayed nor allowed to flow on the surface there by avoiding possible spray and runoff losses. The controlled release of water is as per the crop demand and thus eliminates deep percolation losses also. The outlet through the water is emitted are called as emitter or droppers. The main components of drip system are emitters and pipe network, control chamber (filter fertilizer tank, regulating valve meter) and the pumping unit.

Advantages of drip: 1. Water saving 2. Labours saving 3. Less weed growth 4. More crop response 5. Optimum use of water and fertilizers 6. Early maturation.

Disadvantages: 1. Sensitively to clogging 2. Comparatively high cost 3. Skill is required for designing, installation, operation and maintenance.

SECTION "B" (4M)

1 Match the pairs

'A'		'B'
1	Epicotyl grafting	1 Mango
2	Air layering	2 Guava
3	Ethylene	3 Artificial ripening
4	NAA	4 Fruit retention

(4m)

Q.12 Fill in the blanks with appropriate words.

Ans.

1. Sorosis type of composite fruits is found in **pineapple or jackfruit** fruit crop.
2. A process of development of fruit without pollination or fertilization is termed as **Parthenocarpy.**
3. Konkan Samrat is new hybrid variety of **mango** fruit crop.
4. In **cutting** method of vegetative propagation, the plant parts are always detached before rooting.

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