MODEL ANSWER

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE

SEMESTER END EXAMINATION

B.Sc. (Hort.)

Semester	: II (New)			Academic Year	: 2012-2013
Course No.	: H/ HORT-123	Title	: Growth and development of Horticultural Crops		
Credits	: 2 (1+1)				
Day and Date	:	Time	: 2 Hours	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 Define plant growth regulator. Discuss in brief the role of plant growth regulators in horticultural crops.

Ans : Growth regulator is define as chemical substance, other than nutrients and vitamins, regulate the growth of plants when applied in a small quantities.

The role of plant growth regulators in horticultural crops :

Propogation :

The application of 100-500 ppm IBA for soft wood, 500-1500 ppm for semihard wood and 2000-5000 ppm for hard wood is common for vegetative propagation of fruit crops. Apart from auxins, a large number of physiologically and chemically unrelated compounds such as phenols and allied simple aromatic compounds, glycosides, growth inhibiting, growth retarding and ethylene producing chemicals significantly influence the rooting of cuttings. In a few cases, growth retardant such as SADH has also proved beneficial in root induction. GA has antagonistic effect on rooting of cuttings.

Q.2 Describe in brief occurrence and physiological role of Ethylene.

Ans : Physiological actions : Apical dominance arrested, Stimulation of lateral growth, Promote ascission of fruits, leaves and flowers, Induction of flowering, Acceleration of fruit ripening, Root format induced, Chlorophyll decomposition induced, Promote seed germination, Sex-reversal, Suppression of maleness and promotes femaleness in plants, Breaks dormancy.

Q.3 Explain the occurrence and physiological role of Auxin.

1) Auxins

Ans : **Occurrence :** Auxins occur in all plants. NAA, IBA, 2,4-D are synthetic auxins having similar biological activity as IAA. Free auxins are present in different parts of plants.

Physiological role of auxin

1. Cell elongation 2. Promote root initiation 3. Inhibit root elongation.
4. Delay leaf abscission. 5. Induce callus formation 6. Promote epinastic responses

Q.4 Write in brief role of bioregulators on fruit thinning and ripening.

Ans : By means of growth regulators the normal bearing of the orchard could be maintained year after year. Thinning of flowers and fruits occur naturally due to prevention of natural pollination and abortion of young embryos and subsequently dropping of young fruits. NAA (5-10 ppm) and naphthalene acetamde (5-7 ppm) for thinning of apples, peaches, grapes, 2-4-5-T for pears are effective in thinning of flowers and fruits.

Fruit ripening : Uneven ripenng of certrin varieties of grapes in Bangalore Blue, Muscat and Kalishebi could be overcome by plant growth regulators. 2,4-D or 2,4,5-T at 2-5 ppm caused uniform ripenng in grapes.

Ethrel 5000 ppm + NA OH pellets (5-10 g) ripened fruits of persimmon, sapota, banana and mango within 24-48 hours after keeping them in air-tight containers.

Q.5 Explain the occurrence and physiological role of Cytokinins

(2) Cytokines

Ans **Occurrence :** Occur widely in a higher plant. In general, embryo and endosperm of developing seeds, apical meristems show presence of cytokinins.

Natural occurring cytokines : Adenine, Zeatin, dihydrozeatin dimethylallyl adenine

Synthetic cytokines : Kinetin, Benzyladenine, tetrahydropyranyl, benzyl adenine (PBA) and Ethoxyethyladenine.

Physiological role

1) Cell division
2) Shoot initiation
3) Breaking dormancy
4) Retard sensence
5) Male plants having reflexed statements made into hermaphrodite and productive in grapes.
6) Induce parthenocarpy and increase fruit size.

Q.6 What is fruit drop? Discuss in brief different types of fruit drops.

Ans – Dropping of fruit at different stages, fruit development due to competition among the growing fruitlets, lack of pollination, fertilization, unfavourable environmental condition and hormonal imbalance is called as fruit drop.

The different types of fruit drop alongwith control measures :

1. Post setting drop
2. Summer drop
3. Pre mature fruit drop
4. Pre harvest drop

attack of insects, rest of diseases

1. **Post Setting drop** - Dropping or shedding of small fruitlets in large number, due to competition for moisture and nutrients among the large number of fruitset initially.
2. **Summer drop** – This drop occurs in April to May. The atmospheric temperature high from 40^0 C to 45^0 C accompanied with hot dry gusty winds. The humidity is low and this causes vegorous sheding of branches and fruit brought down. There is increased transpiration from leaves and rapid evaporation of soil moisture. As such, leaves draw moisture from the fruits and the later drop down. The drop fruits are soft and lack of tergidity.
3. **Pre mature fruit drop** - This fruit drop occurs from June to beginning of October. This is rainy season and a drop is a most severe because soil solution get diluted due to rain water soil aeration is poor and as such, water absorption by tree is hampered. Fruits are ½ to ¾ grown in size without any external or internal injury with yellowish colour of a stalk end. Auxin deficiency and reduce moisture absorption by the tree and presence of collectotrichum at a pedicel end in together cause the formation of abscission layer and fruit drop down. This drop could be check by spraying auxin.
4. **Pre harvest drop** - In this drop the fruits have been found to content less number of seed per fruit as compared to those held on the tree. Seeds are the seats of a auxin therefore deficiency of auxin causes this drop. Effectively control by spraying NAA 200 ml + bavistin 10 g in 20 lit. of waters.

The main problem confronting the fruit growers is the heavy loss due to dropping of mature fruits before harvest. To prevent such losses 2,4,5-T at 5-8 ppm for apples and lemons, 2-4-D at 8-10 ppm for oranges.

Q. 7 Define growth. Explain in brief its phases in horticultural crops.

Ans : Growth is an permanent and irreversible change in size, volume of leaving structure with an accompanied increasing dry weight.

1. Phases : 1)Vegetative growth phase. 2) Reproductive phase 3) Senescence and death

Q.8 What is seed dormancy? Explain in brief the methods of breaking seed dormancy.

Ans : A condition in the viable seed by which it prevents germination even under optimal con provided for germination.

The causes of seed dormancy and suggest the methods to break it : The applic of the inhibitor to leaves to plant grown in a long day condition result in an increas inhibitor condition level in shoot apex, followed by ceasation of growth and winter formation. The growth inhibiting substances act in opposition to GA to control several pl growth phenomena. The embryo which is enclosed at all stages from its inception to the ripe time of germination by material tissues is entirely dependent for its nutrition supplies an particularly at early stage of development is influenced by hormonal status of the surrounding tissues. The restricted oxygen supply through the seed coat and consequent lipid accumulation at different temperatures could also cause dormancy, but not its maintenance till seed maturity.

Breaking of seed dormancy

Scarification method : i) Rubbing the seed on a sand paper with the help of mechanical scarifier

ii) Helping absorption of moisture by the seed made possible by piercing the hard seed coat a little with needle or a small incision.

iii) Removing completely or breaking the seed coat

iv) Soaking hard coated seed in concentration H_2SO_4 for 1-60 minutes duration.

Stratification –

1) Seeds are subjected to pre chilling or incubating treatments at low temperature ($0^0 - 5^0$) over a moist substratum for 3-10 days, if the dormancy is due to inhibition at embryo.

2) Some seed require pre-heating or incubating at40-45^{0}C before germination at the required temperature.

3) Hot water treatment is also used to brick dormancy cause by hard seed cout in legumes. Seeds are soked in water at 18 ^{0}C for 1 to 5 minutes before placing them for germination at optimal temperature.

Treatment with a growth regulator and Other chemicals :

Treatment at low concentration of growth regulators and other chemicals may break the endogenous dormancy of seeds caused by the presence of some inhibitors :

a) GA and Kinetins are widely used for this purpose. Seeds either soaked in GA (10-1000 ppm) or kinetin (10-50 ppm) are washed in water and sown or are germinated on the substrate moistened with GA or Kinetin solution.

b) KNO_3 breaks dormancy of light requiring seeds in dark. Germination substratum is saturated with 0.2% KNO_3 solution to break dormancy of tomato seeds.

c) Thiourea break dormancy of seeds which require light or pre-chilling in lettuce se . Generally 0.5 – 3% solution is used for soaking seeds for a short time and then transfern them to water, e.g. in gladiolus, chichori etc.

d) By soaking and washing repeatedly in water germination block induced by some inhibitors like dormin present in seeds may be removed.

Q.9 Write in short the role of bio regulators on fruit set and fruit development.

Ans : Spraying of NAA, TIBA and PCPA auxins on flowers increases the frit set. Dipping of grape bunches (young fruits) in GA solution increases the berry size in *Thompson seedless* grapes. If the fruits could be brought in the market in early part of the season, they fetch good price. Spraying with 2-4-5-T and B-9 hastens maturity of apples by 1-4 weeks.

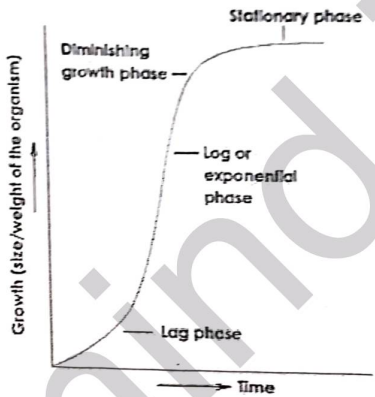
Q.10 Write short notes (Any Two)

Ans : **1) Sex expression :** Plant growth regulators can change the sex of the flowers. Maleic hdrozide (MH) has been successfully employed to induced male sterility in tomatoes and cucurbits. This is particularly useful in plant breeding. Application of NAA, IAA and GA at 50-100 ppm increased the female flowers in pumpkin, cucumber and ridge gourd to get more yield than the normal. TIBE, NAA and M (100-500 ppm) altered the sex radically in favour of femaleness in snake gourd.

2) **Senescence** : It is promoted by ABA accompanied by rapid loss of chlorophyll proteins and RNA in accelerated when the leaf disks are floated on ABA solution increasing in ABA concentrates, loss of Chlorophyll.

The last stage of development when anabolic biochemical process give way to catabolic processes leading to death of the tissue e.g. In banana and citrus fruits ripening, loss of chlorophyll and appearance of caratencids (degreening). Application of GA delay ripening and fruit remain green flora layer duration.

3) **Growth curve** : It is a sigmoid curve between growth rate verses time. Rate of growth during the three phases always follows S-shaped curve when studied against the time required. It is called sigmoid curve of growth.



Growth curve

SECTION 'B'

Q.11 Write full form of following abbreviations.

1) MH - Malic hydrazide
2) CCC - 2-Chloroethyl trimethyl ammonium
3) PCPA - *para*-Chlorophenoxy acetic acid
4) TIBA - 2-3-5-Trildabenzoic acid

Q.12 Match the pair

A	B
1. Cytokinins	(d) a. Adenine
2. Growth retardant	(c) b. B-9
3. Inhibitor	(a) c. ABA
4. Auxanometer	(b) d. Growth of Plant

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