SEMESTER END EXAMINATION

Model Answers B.Sc. (Hort.)

Semester	:	II (New)	Academic Year	:	2014-15
Course No.	:	HORT-123	Title	:	Growth and Development of Horticultural Crops
Credits	:	2 (1+1)			
Day & Date	:		Time		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"

Ans.1 Def.: Plant growth regulators are organic compounds other than nutrients which modify, regulate, enhance, retard or inhibit the plant physiological processes when they are applied at minute quantities.

1) Plant propagation: Better germination, early and profuse rooting of different cuttings, layering and hastening of the stem growth of rootstock in nursery.
2) Increase growth, yield and quality.
3) Early flowering and better fruit setting.
4) Prevention of fruit drop.
5) Sprouting and breaking the dormancy of buds.
6) Delay in sprouting.
7) Blossom thinning.
8) Development of seedless fruits.
9) Hastening and delay in the maturity of fruits
10) Weed control.
11) Ripening of fruits.
12) Colour development.
13) Dwarfening of plants. (Def. 1 mark, Role 3 marks)

Ans.2 Growth can be defined as "vital process, which brings about a permanent change in any plant or its parts in respect to its size, form, weight and volume as well as dry weight".

Phases of growth: Growth is a complex process, occurs in meristematic region. Before completion of this process, a meristematic cell has to pass through three phases; viz.,

i) cell formation phase *i.e.* cell division (Lag phase)
ii) cell elongation or enlargement phase (Log phase)
iii) cell differentiation (cell maturation) phase (Stationary phase)

These three phases can be seen clearly in a longitudinal section of root apex where cell formation phase is represented by meristematic zone and cell enlargement phase by cell elongation zone. (Def. 1 mark; Phases, 3 marks)

Ans.3 Short notes (1 marks for each)

1. Seed dormancy: Seed dormancy: If all the conditions such as oxygen, water and suitable temperature are favourable the seed germinates immediately. But many seeds

do not germinate under favourable conditions and called as dormant seeds. The reasons causing dormancy can be

i) Dormancy due to seed coat ii) Dormancy due to immature embryo iii) Dormancy due to chemical inhibitors iv) Dormancy requiring after ripening in dry seeds v) Dormancy requiring chilling treatments or due to light sensitivity

2. **Vernalization:** Vernalization is defined as the method of inducing early flowering in plants by pretreatment of their seeds at very low temperatures or chilling treatment. Practical utility of Vernalization is i) Crops can be produced earlier *i.e.* crop can be harvested much earlier than control crop. ii) Crops can be grown in the regions where they do not naturally reproduce. iii) Plant breeding works can be accelerated.

3. **Juvenility:** With germination of seed, most plants enter a state of vigorous vegetative growths during which they cannot be readily induced to reproductive growth. Prior to reproductive phase some morphological forms are need to be developed which are much better indices of juvenility. Physiologically the juvenile state is a period when the plant is capable of exponential increase in size, when flowering process cannot be induced and when the plant develops characteristic morphological forms (leaves, stem, thorns). As the juvenile plant grows up, its structure may reflect the gradual change from juvenile to mature types of growth. Thus, plant becomes ready for flowering.

4. **Auxin translocation:** Auxin is transposed basipetally *i.e.* apical to basal end the movement is quite fast 1 to 1.5 cm/h (in root 0.1 to 0.2 cm/h). In some cases acropetal movement (basal to apical end) occurs in very little amount and is directly dependent on presence of oxygen. It means acropetal movement consumes metabolic energy while basipetal movement is physical process; goes on under anaerobic condition. Thus auxin transportation (polar movement) in plants is an active transport system. In general transport of auxin is affected by temperature, oxygen, gravity, age, applied chemicals etc. The transport is inhibited by antiauxins *e.g.* 2,3,5-Triiodobenzoic Acid (TIBA), Naphthylthalamic Acid (NTA) and Ethylene, Chlorohydrin. Dichloroanisole (DCA) is antiauxin effective against 2,4- D.

Ans.4 Flower bud differentiation and description in brief about the factors affecting flower bud formation.

Flower bud formation: The phenomenon of changes of flower bud initiation and flower bud differentiation of flower will be helpful to influence their flower bud production by means of cultural treatments. A bud is an under developed shoot which at later stages differentiates in to a leaf bud or fruit bud due to some internal and external influences.

i) Flower bud initiation: This refers to the anatomical and morphological changes occurring within the bud.

ii) Differentiation of flower bud: This refers to the further development of the embryonic flower within the bud *i.e.* the development of flower parts with in the bud which follows the initiation of the bud.

Factors affecting flower bud formation: a) Nutritional factors b) Environmental factors c) Cultural factors (1 mark process, 3 marks factors)

Ans.5 Senescence can be defined as general and increasing failure of many synthetic reactions that precede cell death. It can also be defined as those changes, which lead sooner or later to the death of an organism or some part of it. It leads to final phase of

development. It leads to cellular breakdown and death. It occurs when degenerative processes exceeds synthetic ones, in other words catabolism exceeds anabolism.

Types of Senescence:

a) Organ Senescence:

- In perennials if shoot dies and plant persists as underground part, it is called as shoot senescence
- Plant continues to grow and leaves at base senesce and die, it is called as sequential senescence particularly in evergreens.
- In deciduous trees where all leaves senesce and die at same time, it is called as synchronous or simultaneous senescence.
- Flower and fruit senescence

b) Whole plant Senescence (2 marks senescence process, 2 marks types)

Ans.6 Occurrence of Auxin: Shoot tip is an active site especially young expanding leaves, apical buds, enlarging tissues, tips of grass or cereal seedling coleoptiles and developing embryos.

Characters: Polar transport, apical bud dominance, variable shoot and root growth, root initiation, delay in abscission, Xylem differentiation (Occurrence 1 mark; characters 3 marks)

Ans.7 Food supply, water supply, oxygen supply, Temperature, Light: Intensity, Quality, Duration, growth hormones; Description on any two related to growth and development. (2 marks factors, 2 marks description)

Ans.8 1. Apical dominance: It is the inhibitory effect of a terminal bud upon lateral bud development.

2. Callus: Undifferentiated mass of parenchymatous cells formed due to unorganized cell division of a tissue.

3. Scarification: It is the process of breaking, scratching, altering or softening the seed covering to make it permeable to water and gases.

4. Photoperiodism: Photoperiodism can be defined as response of plants in general and flowering response in particular to relative length of day and night

5. Parthenocarpy: Parthenocarpy can be defined as formation of fruits without fertilization. (1 mark for explanation)

Ans. 9 Role of endogenous Gibberellins: a) Apical bud dormancy b) Sub apical meristems c) Cell elongation d) Fruit growth e) Flowering f) Seed germination g) Mobilization of foods in seed storage cells

In conclusion, GA plays an important role on growth and development of plants by exerting effects on variety of processes *viz.*, germination, rooting, leaf expansion, flowering, hyponasty of leaves, Parthenocarpy, fruit setting, fruit drop, stem elongation, pollen germination, Breaking of dormancy. (4 marks)

Ans.10 Fruit ripening: After growth period, fruit undergoes some characteristic qualitative changes, which are collectively called as ripening. Some important events in fruit ripening are:

1. Changes with ripening 2. Hormonal control 3. Respiratory climacteric

On the basis of occurrence of climacteric, fruits are divided into

i) Climacteric fruits: Banana, apple, pear, mango, tomatoes etc.

ii) Non-climacteric fruits: Oranges, lemon, citrus, pepper, peanut etc.

4. Ripening mechanism (1 mark ripening, 3 marks physiological events)

SECTION "B"

Ans.11 Spell out the following abbreviations (1 mark each)

1) BA: 6 -Benzyladenine

2) ABA: Abscisic acid

3) 2,4,5-T: 2,4,5-Trichlorophenoxyacetic acid

4) MH: Maleic Hydrazide

Ans.12 Fill in the blanks with appropriate word/s (1 mark each)

1. Thiourea is used for breaking bud dormancy.
2. ABA accelerates leaf senescence.
3. Ethylene is recognized as ripening hormone.
4. Red colour of ripe tomato fruits is due to Lycopene.

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