Short Answer Type Questions-II

Q. 1. What are the conditions required for growth?

Ans. Growth is influenced by a number of conditions which are as follows:

(i) Water is required for cell elongation, maintenance of turgidity of growing cells and providing medium for enzyme action.

(ii) Oxygen is essential for aerobic respiration and hence availability of energy for biosynthetic activity.

(iii) Nutrients are raw materials for synthesis of protoplasm, as well as the source of energy.

(iv) Light is required for tissue differentiation, synthesis of photosynthetic pigments and photosynthesis.

(v) The optimum temperature for proper growth is 28-30°C

(vi) Environmental signals such as light &gravity also affect certain stages of growth.

Q. 2. Draw a diagram to show the sigmoid growth curve and write the names of the three phases in it. **[Imp.]**

OR

What does a sigmoid growth curve represent?

Ans. The three phases of growth are:

(i) Lag phase: Growth is slow in the initial stage

(ii) Exponential period of growth: It is second phase of maximum growth.

(iii) Stationary phase: When the nutrients become limiting growth slows down.

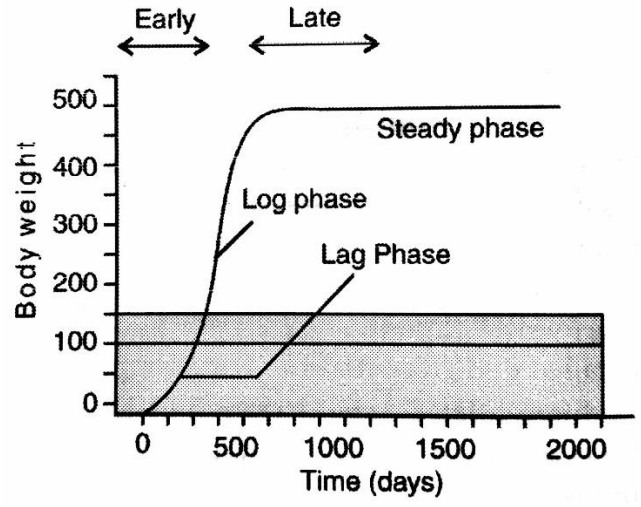

Fig. Growth curve

Q. 3. Discuss the statement: The growth is measurable. **[V. imp]**

Ans. The growth is measurable: (i) The growth (at a cellular level) is basically a consequence of increase in the amount of protoplasm.

(ii) We cannot measure growth directly, it is measured by some quantity that is more or less proportional to it. So the growth is measured by a variety of parameters like increase in fresh weight; dry weight; length; area; volume and cell number etc.

(iii) One single maize root apical meristem may give rise to more than 17,500 new cells per hour.

(iv) The cell in a watermelon can increase in size by upto 3,50,000 times.

(v) Therefore, growth may be expressed as increase in cell number or as increase in size of cell.

(vi) The growth of a pollen tube is measured in terms of length.

(vii) An increase in surface area denotes growth in a dorsiventral leaf or dicot leaf.

Q. 4. Distinguish between plant and animal growth.
Ans.

S. No.	**Plant growth**	**Animal growth**
(i)	Plant growth occurs in only meristematic zones.	In animal growth, almost all the cells increase in size.
(ii)	Plant growth is constructed in a modular fashion. Development is open-ended and their structure are never complete.	Embryonic growth is completed quite early, but mature size may be reached at specific periods.
(iii)	Firstly growth is uniform but later it becomes irregular.	Animals grow in a synchronous and well defined way.
(iv)	The growth is unrestricted and diffused.	The growth is restricted and not diffused.
(v)	The freshly formed seedling cannot be called a miniature plant.	The young animal looks like a miniature version of the adult.

Q. 5. What is differentiation? How can you distinguish between dedifferentiation and redifferentiation ?

Ans. The cells which are derived from root apical meristem and shoot apical meristem differentiate and mature to perform specific functions. This act leading to maturation is termed as differentiation. During this, the cells undergo a few major structural changes both in their cell walls and protoplasm.

(i) In plants, the living differentiated cells can regain the capacity to divide mitotically under certain conditions. The sum of events are termed as dedifferentiation. A dedifferentiated tissue

can act as meristem. *e.g.,* interfasicular vascular cambium, cork cambium and wound meristem.

(ii) The product of dedifferentiated cells or tissues which lose the ability to divide are called redifferentiated cells and the term is known as redifferentiation. Secondary xylem and econdary phloem that form interfasicular vascular cambium, secondary cortex and cork are the examples of redifferentiated tissues.

Q. 6 Why is ABA known as 'stress hormone'?

Mention any two functions of this hormone. How are they antagonistic to gibberellins?
[KVS Silchar 2017]

Ans. Abscisic acid is also called as stress hormone because the synthesis of abscissic acid is stimulated by drought, water logging and other adverse environmental conditions. It is produced in many parts of the plants but more abundantly inside the chloroplast of green cells. Abscisic acid owes its name to its role in the abscission of plant leaves. In preparation for winter, ABA is produced in terminal buds. This slows plant growth and directs leaf primordia to devlop scales to protect the dormant buds during the cold season.
They are antagonistic to gibberellins as gibberellins promotes stem elongation while abscisics acid acts as growth inhibitor.

Q. 7. Define plant hormone. In how many groups does plant growth regulators are classified?

Ans. A plant hormone is a chemical substance produced naturally in plants which is translocated to another region for regulating one or more physiological reaction, when present in low concentration. Based on functions, plant growth regulators are broadly divided into two groups.

(i) Growth Promoters: Such plant growth regulators are involved in growth promoting activities such as cell division, cell enlargement, pattern formation etc. These include auxins, gibberellins and cytokinins.

(ii) Growth Inhibitors: Such PGRs are involved in various growth inhibiting activities such as promotion of dormancy and abscission. These indude abscisic acid and ethylene.

Q. 8. Name the plant hormone which was discovered from fungus. Give its any functions.

OR

Give four major roles of Gibberellins as a plant growth regulator.

[KVS-2012-13]

Ans. Gibberellin plant hormone was discovered from the fungus *Gibberella fujikuroi.* Its four functions are:

(i) Bolting and flowering.

(ii) Stem elongation and fruit elongation.

(iii) Parthenocarpy.

(iv) Early seed production.

Q. 9. What is abscissic acid and why it is called as stress hormone ?

Ans. Abscisic acid is a mildly acidic growth hormone, which functions as a general growth inhibitor by counteracting other hormones or reactions mediated by them.
Abscisic acid is also called as stress hormone because the synthesis of abscisic acid is stimulated by drought, water logging and other adverse environmental conditions. It is produced in many parts of the plants but more abundantly inside the chloroplasts of green cells.

Q. 10. What is the effect of each of the following on germination of seeds:
(i) Abscisic acid,
(ii) Gibberellin

Ans. (i) Abscisic acid (ABA): It is known as growth inhibitor. It is synthesised in leaves and transported to other parts of the plants by phloem. It promotes the dormancy of seeds. ABA inhibits seed germination. The dormancy of seeds is due to abscissic acid. It usually interacts with other plant growth regulators. Dormant seeds germinate when ABA is overcomed by Gibberellins.

(ii) During seed germination, especially of cereals, gibberellins stimulates the production of some mRNA and hydrolytic enzymes like amylases, lipases, ribonucleases and proteases. The enzyme solubilises the reserve food of the seed which is then transferred to the embryo axis for its growth.

Q. 11. What is the importance of photoperiodism ?

Ans. Importance of photoperiodism:

(i) Photoperiodism determines the season in which a particular plant shall come to flower.

(ii) Knowledge of photoperiodic effect is useful in keeping some plants in vegetative growth, to obtain higher yield of tubers, rhizomes etc., or keep the plant in reproductive stage.

(iii) The phenomenon has helped the plant breeders in effecting cross-breeding in plants.

(iv) A plant can be made to flower throughout the year under greenhouse conditions if a favourable photoperiod is provided to it.

Q. 12. What are the factors which govern the appearance of reproductive phase of flowering in angiosperms?

Ans. The factors which govern the appearance of reproductive phase of flowering in angiosperms are:

(i) Completion of juvenile phase and attainment of adult phase.

(ii) Exposure to suitable day length.

(iii) Proper temperature.

Q. 13. What are the requirements of vernalization ?

Ans. The requirements of vernalization are:

(i) Low temperature is required which is usually 0-5°C.

(ii) Period of low temperature treatment.

(iii) Actively dividing cells.

(iv) Water is required for perceiving the stimulus of vernalization

(v) Aerobic respiration and proper nourishment.

Q. 14. Distinguish between auxins and gibberellins.

Ans.

S.NO	Auxins	Gibberellins
(i)	Induce rooting.	Do not induce rooting.
(ii)	Show apical dominance.	Do not show apical dominance.
(iii)	Have single/double unsaturated ringed structure.	Are gibbane-ringed
(iv)	No bolting.	Bolting occurs.
(v)	Transportation is only basipetal.	Transportation is acropetal and basipetal both.
(vi)	Genetically dwarf shoots are unable to undergo elongation by its application.	By its application, the genetically dwarf shoots undergo elongation.

Q. 15. What do you understand by abscission ? How does it occur in plants ?

Ans. (i) Abscission is a natural separation or shedding of leaves, foliage branches, fruits, floral parts etc., from the plants.

(ii) A special narrow zone develops in the area of abscission. It is called abscission zone. This zone is externally differentiated either by a shallow groove or by difference in colour of the surface.

(iii) Tyloses develop in xylem vessels while callose plugs develop in the area of sieve plates.

(iv) Xylary tyloses reduce water supply to the organ causing water stress. As water stress increases, the callose plugs dissolve.

(v) The various nutrients present in the abscissing organ pass back into the plant.

(vi) Two distinct layers develop in the abscission zone, separation layer and protective layer.

(vii) The protective layer is meant for dessication and checking entry of pathways. Abscission occurs in the separation layer

Q.16. Give one antagonistic function of each of the following hormone pairs.

(i) Gibberellins-Abscissic acid
(ii) Cytokinin-Ethylene
(iii) Ethylene-Auxin.

Ans. (i) Gibberellins: Stem elongation.
Abscissic acid: Acts as a growth inhibitor.

(ii) Cytokinin: Counteract the dominance of apical buds.
Ethylene : Causes apical dominance and fruit ripening.

(iii) Auxin: It inhibits the above functions.
Ethylene: It breaks seed and bud dormancy and induces respiration rate during fruit ripening.

Q. 17. What is the significance of vernalization?

Ans. The significance of vernalization are:

(i) It can help in shortening the juvenile or vegetative period of plant and bring about early flowering. It is not only applicable to temperate plants but also to tropical plants. *e.g,* wheat, rice.

(ii) It increases yield, resistance to cold and diseases.

Q. 18. Differentiate between short day plants and long day plants.

Ans.

S.No	Short day Plants (SPD)	Long day plants (LDP)
(i)	Plants flower under photoperiods of less than critical day length.	Plants flower under photoperiods of more than critical day length.
(ii)	Interruption during light period does not inhibit flowering.	Interruption during light period inhibits Flowering.
(iii)	Flowering is inhibited if long dark period is interrupted midway by a flash of light.	Flowering occurs if dark period is interrupted by light.
(iv)	Long continuous and uninterrupted dark period is critical for flowering.	Light period is critical for flowering.
(vi)	Several plants flower under continuous dark if light is supplemented with sucrose.	Several plants flower under continuous light. The dark period is not at all required.