

Chapter 16

Plant and Animal Hormones

I. Choose the correct Answer:

Question 1.

Gibberellins cause:

- (a) Shortening of genetically tall plants
- (b) Elongation of dwarf plants
- (c) Promotion of rooting
- (d) Yellowing of young leaves

Answer:

- (b) Elongation of dwarf plants

Question 2.

The hormone which has a positive effect on apical dominance is ____.

- (a) Cytokinin
- (b) Auxin
- (c) Gibberellin
- (d) Ethylene.

Answer:

- (b) Auxin

Question 3.

Which one of the following hormones is naturally not found in plants:

- (a) 2, 4-D
- (b) GA3
- (c) Gibberellin
- (d) IAA

Answer:

- (a) 2, 4-D

Question 4.

Avena coleoptile test was conducted by ____.

- (a) Darwin
- (b) N. Smit
- (c) Paal
- (d) F.W. Went.

Answer:

- (d) F.W. Went.

Question 5.

To increase the sugar production in sugarcane they are sprayed with

- (a) Auxin
- (b) Cytokinin
- (c) Gibberellins
- (d) Ethylene

Answer:

- (d) Ethylene

Question 6.

LH is secreted by ____.

- (a) Adrenal gland
- (b) Thyroid gland
- (c) Anterior pituitary
- (d) Hypothalamus.

Answer:

- (c) Anterior pituitary

Question 7.

Identify the exocrine gland:

- (a) Pituitary gland
- (b) Adrenal gland
- (c) Salivary gland
- (d) Thyroid gland

Answer:

- (c) Salivary gland

Question 8.

Which organ acts as both exocrine gland as well as endocrine gland?

- (a) Pancreas
- (b) Kidney
- (c) Liver
- (d) Lungs.

Answer:

- (a) Pancreas

Question 9.

Which one is referred to as “Master Gland”?

- (a) Pineal gland
- (b) Pituitary gland
- (c) Thyroid gland
- (d) Adrenal gland

Answer:

- (b) Pituitary gland

II. Fill in the blanks:

1. causes cell elongation, apical dominance and prevents abscission.
2. is a gaseous hormone involved in abscission of organs and acceleration of fruit ripening.
3. causes stomatal closure.
4. Gibberellins induce stem elongation in plants.
5. The hormone which has negative effect on apical dominance is
6. Calcium metabolism of the body is controlled by
7. In the islets of Langerhans, beta cells secrete
8. The growth and functions of thyroid gland is controlled by
9. Decreased secretion of thyroid hormones in the children leads to

Answer:

1. Auxin
2. Ethylene
3. Absciscic acid
4. Rosette
5. Ethylene
6. Parathormone
7. Insulin
8. Thyroid Stimulating Hormone (TSH)
9. Cretinism

III. Match Column I with Columns II and III

Question 1

Column I	Column II	Column III
Auxin	<i>Gibberella fujikuroi</i>	Abscission
Ethylene	Coconut milk	Internodal elongation
Absciscic acid	Coleoptile tip	Apical dominance
Cytokinin	Chloroplast	Ripening
Gibberellins	Fruits	Cell division

Answer:

Column I	Column II	Column III
Auxin	Coleoptile tip	Apical dominance
Ethylene	Fruits	Ripening
Abscisic acid	Chloroplast	Abscission
Cytokinin	Coconut milk	Cell division
Gibberellins	<i>Gibberella fujikuroi</i>	Internodal elongation

Question 2.

Match the following hormones with their deficiency states.

Hormones		Disorders	
A	Thyroxine	(i)	Acromegaly
B	Insulin	(ii)	Tetany
C	Parathormone	(iii)	Simple goitre
D	Growth hormone	(iv)	Diabetes insipidus
E	ADH	(v)	Diabetes mellitus

Answer:

- A. (iii)
- B. (v)
- C. (ii)
- D. (i)
- E. (iv)

IV. State whether True or false, If false write the correct statement.

1. A plant hormone concerned with stimulation of cell division and promotion of nutrient mobilization is cytokinin.
2. Gibberellins cause parthenocarp in tomato.
3. Ethylene retards senescence of leaves, flowers and fruits.
4. Exophthalmic goiter is due to the over secretion of thyroxine.
5. Pituitary gland is divided into four lobes.
6. Oestrogen is secreted by corpus luteum.

Answer:

1. True
2. True
3. False – Ascorbic Acid retards senescence of leaves, flowers and fruits.
4. True
5. False – Parathyroid gland is divided into four lobes.

6. False – Oestrogen is produced by the Graffian follicles.

V. Assertion and Reasoning:

Direction: In each of the following Questions a statement of assertion (A) is given and a corresponding statement of reason (R) is given just below it. Mark the correct statement as.

Question 1.

Assertion (A): Application of cytokinin to marketed vegetables can keep them fresh for several days.

Reason (R): Cytokinins delay senescence of leaves and other organs by mobilisation of nutrients.

- (a) If both A and R are true and R is correct explanation of A
- (b) If both A and R are true but R is not the correct explanation of A
- (c) A is true but R is false
- (d) Both A and R are false

Answer:

- (b) If both A and R are true but R is not the correct explanation of A

Question 2.

Assertion (A): Pituitary gland is referred as “Master gland”.

Reason (R): It controls the functioning of other endocrine glands.

- (a) If both A and R are true and R is correct explanation of A
- (b) If both A and R are true but R is not the correct explanation of A
- (c) A is true but R is false
- (d) Both A and R are false

Answer:

- (a) If both A and R are true and R is correct explanation of A

Question 3.

Assertion (A): Diabetes mellitus increases the blood sugar levels.

Reason (R): Insulin decreases the blood sugar levels.

- (a) If both A and R are true and R is correct explanation of A
- (b) If both A and R are true but R is not the correct explanation of A
- (c) A is true but R is false
- (d) Both A and R are false

Answer:

- (a) If both A and R are true and R is correct explanation of A

VI. Answer in a word or sentence:

Question 1.

Which hormone promotes the production of male flowers in Cucurbits?

Answer:

Gibberellin promotes the production of male flower in Cucurbits.

Question 2.

Write the name of synthetic auxin.

Answer:

2, 4 D (2, 4 Dichlorophenoxy Acetic acid).

Question 3.

Which hormone induces parthenocarpy in tomatoes?

Answer:

Gibberellin induces parthenocarpy in tomatoes.

Question 4.

What is the hormone responsible for the secretion of milk in the female after childbirth?

Answer:

Prolactin stimulates the production of milk after childbirth. Oxytocin helps milk ejection from the mammary gland after childbirth.

Question 5.

Name the hormones which regulates water and mineral metabolism in man.

Answer:

Mineralocorticoids hormones of Adrenal cortea maintain the water balance and mineral metabolism in man.

Question 6.

Which hormone is secreted during an emergency situation in a man?

Answer:

The hormones of Adrenal medulla,

- Epinephrine (Adrenaline)
- Norepinephrine (Noradrenaline) are secreted during an emergency situation in man.

Question 7.

Which gland secretes digestive enzymes and hormones?

Answer:

Pancreas secretes digestive enzymes and hormones.

Question 8.

Name the endocrine glands associated with kidneys.

Answer:

Adrenal gland, which is called suprarenal glands is associated with kidneys.

VII. Short Answer Questions:

Question 1.

What are synthetic auxins? Give examples.

Answer:

Artificially synthesized auxin which has the properties of auxins are called Synthetic Auxin.
Eg: 2, 4-D

Question 2.

What is bolting? How can it be induced artificially?

Answer:

Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering is called bolting. It can be induced artificially before the crop is harvested.

Question 3.

Bring out any two physiological activities of abscisic acid.

Answer:

The two physiological activities of abscisic acid are:

1. During water stress and drought conditions, Absciscic acid causes stomatal closure.
2. Absciscic acid induces bud dormancy towards the approach of winter in trees like birch.

Question 4.

What will you do to prevent leaf fall and fruit drop in plants? Support your Answer with reason.

Answer:

- Very chill deposition on leaves and fruits cause the drop in plants. Protect the tree from frost providing an overhead cover.
- The plant hormone ethylene controls fruit ripening, flower wilting and leaf fall by stimulating the conversion of starch and acids to sugar.

Question 5.

What are chemical messengers?

Answer:

Endocrine glands control and coordinate the body functions through secreting certain chemical messengers called hormones.

Question 6.

Write the differences between endocrine and exocrine gland.

Answer:

Exocrine gland	Endocrine gland
Exocrine glands have specific duct to carry their secretion.	Endocrine glands are found in different regions of the body.
They have specific duct.	They do not have specific duct, so they are called ductless gland.

The secretion are produced from the specific duct.	The secretion diffuse into the blood stream and reach the target organ.
Eg: Salivary glands sweat glands	Eg: Pituitary Adrenal glands

Question 7.

What is the role of parathormone?

Answer:

The parathormone regulates calcium and phosphorus metabolism in the body. They act on bone, kidney and intestine to maintain blood calcium levels.

Question 8.

What are the hormones secreted by posterior lobe of the pituitary gland? Mention the tissues on which they exert their effect.

Answer:

The hormones secreted by the posterior pituitary are:

1. Vasopressin or Antidiuretic hormone: In kidney tubules it increases reabsorption of water.
2. Oxytocin: They exert their effect on the muscles of uterus which helps in the contraction of smooth muscles of uterus at the time of child birth and milk ejection from mammary gland after child birth.

Question 9.

Why are thyroid hormones referred to as personality hormone?

Answer:

Thyroid hormones are referred to as personality hormone because they are essential for normal physical, mental and personality development.

Question 10.

Which hormone requires iodine for its formation? What will happen if intake of iodine in our diet is low?

Answer:

The formation of Thyroxine or Thyroid hormone requires iodine. If there is an inadequate supply of iodine in our diet it leads to goitre.

VIII. Long Answer Questions:

Question 1.

(a) Name the gaseous plant hormone. Describe its three different actions in plants.

(b) Which hormone is known as a stress hormone in plants? Why?

Answer:

(a) Ethylene is a gaseous plant hormone. It is a growth inhibitor. The different actions of ethylene are as follows:

- Ethylene promotes the ripening of fruits, eg. Tomato, Apple, Mango, Banana and etc.
- Ethylene inhibits the elongation of stem and root in dicots.
- Ethylene hastens the senescence of leaves and flowers.
- Ethylene stimulates the formation of Abscission zone in leaves, flowers and fruits.
This leads to premature shedding.
- Ethylene breaks the dormancy of buds, seeds and storage organs.

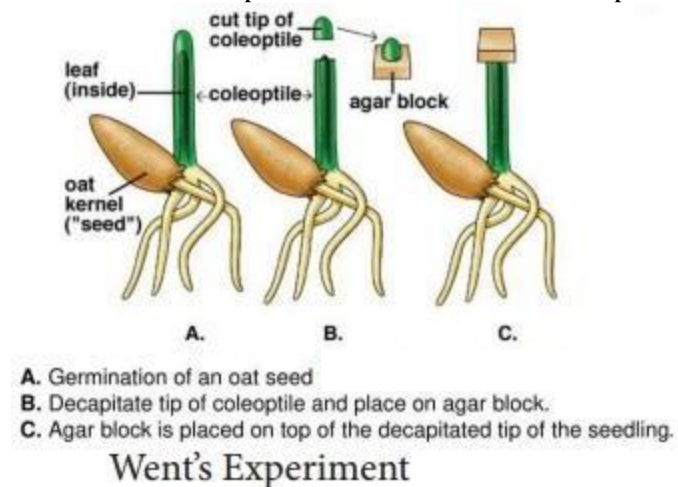
(b) Absciscic acid (ABA) is a growth inhibitor which regulates abscission and dormancy. It increases the tolerance of plants to various kinds of stress. So, it is also called a stress hormone.

Question 2.

Describe an experiment which demonstrates that growth stimulating hormone is produced at the tip of coleoptile.

Answer:

Frits Warmolt Went (1903 – 1990), a Dutch biologist demonstrated the existence and effect of auxin in plants. He did a series of experiments in *Avena* coleoptiles.



In his first experiment he removed the tips of *Avena* coleoptiles. The cut tips did not grow indicating that the tips produced something essential for growth. In his second experiment he placed the agar blocks on the decapitated coleoptile tips. The coleoptile tips did not show any response. In his next experiment he placed the detached coleoptile tips on agar blocks. After an hour, he discarded the tips and placed this agar block on the decapitated coleoptile. It grew straight up indicating that some chemical had diffused from the cut coleoptile tips into the agar block which stimulated the growth.

From his experiments Went concluded that a chemical diffusing from the tip of coleoptiles was responsible for growth and he named it as "Auxin" meaning "to grow".

Question 3.

Write the physiological effects of gibberellins.

Answer:

- Application of gibberellins on plants stimulates extraordinary elongation of internodes. eg. Corn and Pea.
- Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering, called bolting.
- Gibberellins promote the production of male flowers in monoecious plants like Cucurbits
- Gibberellins break the dormancy of potato tubers.
- Gibberellins are inducing the formation of seedless fruit, termed as Parthenocarpic fruits (Development of fruits without fertilization) eg. Tomato.

Question 4.

Where are oestrogens produced? What is the role of oestrogens in the human body?

Answer:

Oestrogen is produced by the Graafian follicles of the ovary.

Functions of oestrogens:

1. It brings about the changes that occur during puberty.
2. It initiates the process of oogenesis.
3. It stimulates the maturation of ovarian follicles in the ovary.
4. It promotes the development of secondary sexual characters (breast development, high pitched voice etc).

Question 5.

What are the conditions which occur due to lack of ADH and insulin? How are the conditions different from one another?

Answer:

Lack of ADH: Deficiency of ADH (Antidiuretic hormone) reduces the reabsorption of water and causes an increase in urine output (polyuria). This deficiency disorder is called Diabetes insipidus.

Lack of insulin: The deficiency of insulin causes Diabetes mellitus. It is characterised by,

- Increase in blood sugar level (Hyperglycemia).
- Excretion of excess glucose in the urine (Glycosuria).
- Frequent Urination (Polyuria).
- Increased thirst (Polydipsia).
- Increase in appetite (Polyphagia).

Lack of ADH reduces the reabsorption of water and increases the urine output. Lack of insulin causes the Diabetes mellitus, which increases the blood sugar level and excrete the excess glucose in the urine, causing frequent urination.

Insulin:

Deficiency in insulin causes Diabetes mellitus.

Insulin deficiency increases the blood sugar level (Hyperglycemia), excretion of excess glucose in the urine (Glycosuria), frequent urination (Polyuria) increased thirst (Polydipsia), increase in appetite (Polyphagia).

IX. Higher Order Thinking Skills: (HOTS)

Question 1.

What would be expected to happen if

(a) Gibberellin is applied to rice seedlings.

Answer:

Causes imemodal elongation in rice.

(b) A rotten fruit gets mixed with unripe fruits.

Answer:

If a rotten fruits get mixed with unripe fruit. Then the ethylene produced from the rotten fruit will hasten the ripening of the unripe fruits.

(c) When cytokinin is not added to culture medium.

Answer:

Formation of new organs from the callus in tissue culture (Morphogenesis) will not be formed.

Question 2.

A plant hormone was first discovered in Japan when rice plants were suffering from Bakanae disease caused by *Gibberella fujikoroi*. Based on this information Answer the following Questions:

1. Identify the hormone involved in this process.
2. Which property of this hormone causes the disease?
3. Give two functions of this hormone.

Answer:

1. Gibberellins
2. Intermodal elongation
3. Functions:
 - promotes the production of male flowers in monoecious plants.
 - Gibberellins break the dormancy of potato tubers.

Question 3.

Senthil has high blood pressure, protruded eyeball and increased body temperature. Name the endocrine gland involved and hormone secretion responsible for this condition.

Answer:

The gland involved is the thyroid gland. The hormone involved in a thyroid hormone. It is due to excess secretion of thyroid hormones called hyperthyroidism which leads to Graver's disease.

Question 4.

Sanjay is sitting in the exam hall. Before the start of the exam, he sweats a lot, with an

increased rate of heartbeat. Why does this condition occur?

Answer:

This is due to the secretion of the hormone Adrenaline in Adrenal medulla of Adrenal gland.

Question 5.

Susan's father feels very tired and frequently urinates. After clinical diagnosis he was advised to take an injection daily to maintain his blood glucose level. What would be the possible cause for this? Suggest preventive measures.

Answer:

A balance between insulin and glucagon production is necessary to maintain blood glucose concentration.

The deficiency of insulin causes Diabetes Mellitus.

Preventive measure:

1. Take proper or balanced diet.
2. Exercise regularly
3. Avoid stress.