BYJU'S EXAM PREP

Important Questions On Phytochrome

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Q1. Given below are some statements about phytochrome structure-
P. it is present in dimer form
Q. pigment chromophore is covalently bound
R. chromophore is known as flavin
Which statement(s) is correct?
A. P and Q
B. Only P
C. Q and R
D. only Q

Q2. Match the following-

COLUMN A (photoreceptors)	COLUMN B (function)
a. Phytochrome	i. phototropism and chloroplast movements
b. Cryptochrome	ii. induction of flowering
c. Phototropin	iii. cicardian rhythm

A. a-ii, b-iii, c- i
B. a-i, b-iii, c- ii
C. a-iii, b-ii, c- i
D. a-ii, b-i, c- iii

Q3. There are three types of photoreceptors involved in photomorphogenesis- phytochrome, cryptochrome and phototropin. What is the main role of photoreceptor-Phytochrome in plants?
A. act as light regulated serine- threonine kinases
B. act as tyrosine kinases
C. act as phosphatases
D. none of above

Q4. Given below are some statements regarding the phytochrome signalling in dark-
P. COP1 protein is present inside the nucleus
Q. COP1 binded with SPA1
R. HY5 level is high
Which statement(s) is correct?
A. P and Q
B. Only P
C. Q and R
D. only Q

Q5. Phytochrome is an important photoreceptor involved in photomorphogenesis (PM). During daytime or light condition, which protein is involved in photomorphogenesis?
A. HY5 (transcription factor)
B. COP1 (E3 ubiquitin ligase)
C. PHYA
D. CRY1

Q6. Given below are some genes involved in photomorphogenesis initiated by light signal. Out of these, which of the following does NOT belongs to the phytochrome gene family?
A. PHY B
B. PHY B
C. PHY C
D. PHY F

Q7. What will be the correct statement of phytochrome signalling during light?
A. far red light- COP1 exported to cytoplasm- HY5 level high- PIFS degraded- photomorphogenesis
B. far red light- HY5 level high-- COP1 exported to cytoplasm-- PIFS degraded- photomorphogenesis
C. far red light- PIFS degraded-- COP1 exported to cytoplasm- HY5 level high - photomorphogenesis
D. far red light- photomorphogenesis-- COP1 exported to cytoplasm- HY5 level high- PIFS degraded-

Q8. Phytochromes are found in most plants where they regulate growth and developmental processes. What is correct condition for phytochrome during dark or night?
A. Pr form dominates
B. Pfr form dominates
C. both Pr and Pfr forms are present
D. none

Q9. Etiolated seedings are distinguished by short hypocotyl and thick stem.Which condition is generally observed in dark grown etiolated seedlings?
A. PHYA gene abundant
B. PHYB gene abundant
C. both PHYA and PHYB abundant
D. CRY1 abundant

Q10. Match the following-

COLUMN A (photoreceptors)	COLUMN B (genes)
a. Phytochrome	i. PHOT1 and PHOT2
b. Cryptochrome	ii. PHYA and PHYB
c. Phototropin	iii. CRY1 and CRY2

A. a-ii, b-iii, c- i
B. a-i, b-iii, c- ii
C. a-iii, b-ii, c- i
D. a-ii, b-i, c- iii

ANSWERS

1. A	**2. A**	**3. A**	**4. A**	**5. A**	**6. D**
7. A	**8. A**	**9. A**	**10. A**		

SOLUTIONS

Solution-1 Phytochrome belongs to family of chromoproteins with small covalently bound pigment molecule. The pigment is known as chromophore which is linear tetrapyrrole termed as phytochromobilin synthesised in plastids from precursor aminolaevulinic acid. It is similar to mammalian bile pigment bilirubin. Hence, A is correct option**.**

Solution- 2

COLUMN A (photoreceptors)	COLUMN B (function)
a. Phytochrome	ii. induction of flowering
b. Cryptochrome	iii. cicardian rhythm
c. Phototropin	i. phototropism and chloroplast movements

Solution- 3

The phytochromes function as light- regulated serine/ threonine kinases. The C- terminal domains of it helps in the transmission of photosensory signals perceived by the N- terminal region to signal transduction pathways in the cell. When they are activated by red light, they phosphorylate themselves. Hence, A is correct option.

Solution-4

During phytochrome signalling in dark, the COP1 protein is present inside the nucleus and is bonded to SPA1 protein. In dark, levels of Pfr (far-red) are low which leads to switch off of pathway by degradation of HY5 protein (a transcription factor) which is key regulator for photomorphogenesis. Hence, A is correct option.

Solution-5

Phytochrome is an important photoreceptor involved in photomorphogenesis (PM). During day, HY5 protein is involved in PM. The HY5 protein is a transcription factor which is key regulator of PM. When the levels of HY5 are high during daytime, it inhibits the PIFs (Photomorphogenetic inhibiting factor) by their degradation. Hence, A is correct option.

Solution- 6

There are two different classes of phytochrome i.e., Type I and Type II phytochromes with distinct properties. These proteins are encoded by the phytochrome gene family termed as PHY which consists of five members PHYA, PHYB, PHYC, PHYD and PHYE. Type I is encoded by only PHYA whereas type II by PHYB, PHYC, PHYD and PHYE. Hence, D is the correct option.

Solution- 7

far red light- COP1 exported to cytoplasm- HY5 level high- PIFS degraded- photomorphogenesis is correct sequence of events for phytochrome signalling during daytime. During day time, far light is absorbed by pigment which leads to export of COP1 to cytoplasm and consequently HY5 levels become high. HY5 initiates the degradation of PIFs and hence photomorphogenesis occur. Hence, A is correct option.

Solution-8

During night time or dark condition, the Pfr form is converted back to Pr form by the absorption of far-red light at 730nm wavelength. Thus, the Pr form dominates in dark. The Pr form is bright blue in colour and inactive form. When it absorbs red light, it is converted into Pfr form. Hence, A is correct option**.**

Solution-9

In dark- grown etiolated seedlings, the type 1 phytochrome is abundant which is encoded by gene PHYA gene. Its concentration decreases rapidly upon exposure to light during day time as result of mRNA degradation and transcription inhibition. PHYB is abundant in light grown plants whereas CRY1 gene belongs to cryptochrome photoreceptor. Hence, A is correct option.

Solution- 10

COLUMN A (photoreceptors)	COLUMN B (genes)
a. Phytochrome	ii. PHYA and PHYB
b. Cryptochrome	iii. CRY1 and CRY2
c. Phototropin	i. PHOT1 and PHOT2

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