BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE (PILANI) HYDERABAD CAMPUS

1ST SEMESTER 2022-23

COMPREHENSIVE EXAMINATION

PLANT PHYSIOLOGY-BIO F312 (OPEN BOOK)

Date: December 26. 2022 Max. Marks-70 Max. Time- 3 hrs.

**Answer all the questions**

**Note: 1. Write your answers clearly and legibly**

**2. Answer the question precisely. Blindly copying the relevant sections from the book or slides will not fetch any marks**

1. The following table mentions a list of defects/mutations. State how each defect affects the physiological process listed next to it and provide appropriate justification for your answer. (4x3=12M)

|  |  |  |
| --- | --- | --- |
| Defect | How does it impact? | Justification |
| Loss of function mutation in gene encoding inwardly rectifying K+ channels in guard cells |  Xylem loading:  |  |
| Loss of function mutation in SUT transporters | Phloem loading: |  |
| Lack of suberin deposits in root endodermal cells | Xylem loading: |  |

1. *Pseudomonas syringae* is a phyllospheric, pathogenic bacterium that infects tomato leaves in a **host/race-specific manner**. Following infection, the plants are known to increase the production of H2O2 in the infected leaves and salicylic acid in almost all parts of the plant. With this scenario in mind, answer the following questions.
2. What is the precise importance of the aforementioned chemicals in building inducible resistance against the pathogen? (4M)
3. Explain what exactly happens between the bacterium and the plant (the specific interaction) in order to trigger the signalling pathways leading to the production of the aforementioned chemicals. (4M)
4. (a) Briefly describe how H**+** ATPase helps in auxin transport. (5M)

 (b) Describe two biological functions of auxins that are antagonistic to effects of cytokinins (5M)

1. (a) What is a phosphomimic? How are they used in research? (6M)

 (b) What is autophosphorylation and which enzymes undergo autophosphorylation? (4M)

1. (a) Phytohormone ‘X’ inhibits the mitosis of the plant tissue ‘Y’. Name X and Y. (4M)

Assume that you visit a farm and see that the farmer is applying a chemical in his farm. When you enquire with him, you find out that the chemical is to shorten the stem elongation. Based on our discussion in this course, answer the following:

(b) Which phytohormone the chemical would target? (2M)

(c) Mention two commercial benefits of shortening stem elongation(4M)

1. (a) Very-Low-Fluence Responses are type of phytochrome responses that are not far-red reversible. Why? (5M)

(b) Plant seedlings typically show elongated hypocotyl when grown in dark. Assume that you are growing seedlings in a dark room with specific wavelength of light in it. To your surprise, you see that hypocotyl elongation is not happening. Based on the given information explain why this could be happening. Assume that the plants being grown are wild-type. (5M)

1. (a) When plants face water deficiency what will guard cells do? Name one advantage and disadvantage of guard cells action under such a scenario. Also name the phytohormone which is predominantly associated with this effect. (6M)

(b) What kind of Short-day plants can flower under long-day conditions? Justify your answer. Assume that plants are wild-type. (4M)