Examination paper for BI2022 Plant Growth and Development

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Examination date: 30. November 2015
Examination time (from-to): 09:00 to 12:00
Permitted examination support material:
This is an open-book exam. Students may bring in and consult any printed or written material, including the textbook, dictionaries, copies of journal articles, and their own notes.
Other information:
The exam will be evaluated quantitatively; the point totals are given at the end of each question.

Language: By prior agreement, the questions are given in English, but answers may be written in Bokmål, Nynorsk, or English.

Number of pages: 2 (including cover page)
Number of pages enclosed: 1 (examination questions)
Part I. Journal article comprehension and evaluation.

You have been provided with the following journal article to read before the exam:


1. What is the motivation for and purpose of the research presented in the article? Why use Helianthemum and Terfezia? What hypotheses are stated or implied in the introduction? (20)

2. What is “M medium” and how does it differ from standard agar-based growth media used in experiments with Arabidopsis or other plants? How might this affect the results of the experiment? (20)

3. Briefly evaluate the following elements based on the content of the paper:
   a. Statement on p. 6: “In the absence of auxin or Terfezia, root hair initiation in the single receptor mutation tir1-1 plants was inhibited as compared with wild-type plants… It follows that fungal auxin is directly involved in the first step of induction of root hair initiation.” (10)
   b. Figure 7: Which means are being compared in the multiple comparison procedure? How can you tell? (10)
   c. Statement on p. 8: “Once the mycorrhizal relationship was fully established, the developmental gap between non-mycorrhizal and mycorrhizal plants vanished and the mycorrhizal plants showed stimulated growth.” (10)
   d. Statement on p. 9: ”Both Arabidopsis and Helianthemum sessiliflorum responded in a similar way to the presence of another ectomycorrhizal fungus, namely, Pisolithus tinctorius.” (10)

4. Briefly evaluate the following section headings based on the data and text in the relevant section (how well is the statement supported by the rest of the section?):
   a. “T. boudieri interferes with the positive gravitropic response of the taproot” (10)
   b. “Fungal-secreted IAA induces taproot negative gravitropism” (10)
   c. “Terfezia induces expression of auxin carriers in Arabidopsis” (10)
   d. “Terfezia and auxin induce root hair initiation, root hair elongation, and taproot growth inhibition” (10)
   e. “Fungal auxin coordinates the growth rates of the symbionts and inhibits host development at an early stage of the mycorrhiza” (10)

5. Evaluate the paper as a whole. How convinced are you that the main assertions given in the title and abstract are true? (20)

Additional question

6. Discuss: a. the mechanism of tip growth and b. its role in the development of specific cell types and the overall growth and development of the plant (50).

200 points total.