

1. What may cause the photo damage? Please give the reason of why it's occur under following stresses: cold, dry or water shortage? (10 points)
2. Please describe what the structure and function of glutathione is? (10 points)
3. How to measure the osmotic potential, water potential, pressure potential, water conductance and relative water content of plant leaf? (15 points)
4. What are the theory and application of the following analytic methods and instrument: 1) DGGE; 2) real time PCR; 3) ICP; 4) HPLC; 5) ELISA (15 points)?
5. If ammonium nitrogen ( $\text{NH}_4\text{-N}$ ) or nitrate nitrogen ( $\text{NO}_3\text{-N}$ ) is the sole source of nitrogen for plants, what will be the pH of the medium after the plant growing for some time as compared with that of the initial pH (4 points)? If mixed forms of nitrogen (i.e.  $\text{NH}_4\text{-N} + \text{NO}_3\text{-N}$ ) are the source of nitrogen how they affect the pH of the medium (2 points)? Give the reason(s) (4 points).
6. Why is the carbon assimilation efficiency of C4 plants higher than that of C3 plants? (5 points) Give some examples (at least three) of C4 plants (5 points).
7. Name the 17 essential elements of the higher plants (5 points). Classification according to the following criteria: the elements need to be reduced before they function; the elements function mostly outside the plasmalemma; the elements function as a free ion (5 points).
8. Why can the plants accumulate nitrate nitrogen to a high concentration (5 points)? Why does only low concentration of ammonium nitrogen be found in the plant tissues (5 points)?
9. On what conditions the nitrogen and potassium will lost to the environment through the leaves of plant, other than the dropping of leaves? (10 points)

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