

1. Please describe the concept of nutrient intensity, nutrient quality and nutrient sources that proposed by Williams (1970) in subjecting following factors: nutrient concentration in soil solution, labile pool, nutrient released during growth, bulk mineral and organic reserves, and field rooting volume? (15 points)
2. What are the possible functions of calcium involved in the signal transduction pathways of plants? (5 points)
3. Please describe the possible roles of "siderphores" related to plant nutrition? (10 points)
4. What are the current ways to manipulate the express of target gene? (10 points)
5. How do photoassimilates transport and store in the sink organs? (10 points)
6. Explain the following terms: (10 points)
  - (1) turgor pressure
  - (2) acid-growth theory
  - (3) biological yield
  - (4) leaf area index (LAI)
  - (5) calcifuge
7. What are the essential elements of higher plants that can be absorbed as gas through leaves and then be assimilated? What are the gas species of these elements? (10 points)
8. What is the photorespiration? What are the metabolic advantages and disadvantages of photorespiration? (10 points)
9. Explain why the timing and application rate of nitrogen fertilizer affect the economical yield of rice. (10 points)
10. What is the difference of the concentrations of boron and calcium between monocotyledon and dicotyledons, respectively? Describe the reasons for the differences. (10 points)