

UNIVERSITY OF FORT HARE

AGS 321

DEGREE EXAMINATIONS
SUPPLEMENTARY EXAMINATIONS
JANUARY 2019

Time: 3 hours

Marks: 100

Subject: Plant Nutrition and Soil fertility

INTERNAL EXAMINERS

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INSTRUCTIONS

ANSWER ALL QUESTIONS

QUESTION ONE (25 MARKS)

Describe the processes involved in the acquisition and uptake of nutrients by plants.
Discuss the factors that may affect one or more of these processes.

QUESTION TWO (25 MARKS)

- (a) Draw a well labeled diagram of the nitrogen cycle (5 Marks)
- (b) Nitrogen fixation is a very important process in agricultural and natural ecosystems. Describe the type of nitrogen fixation process (asymbiotic, symbiotic-legume, symbiotic non-legume, etc) that is most common in each of the following systems and state the quantities of nitrogen that are commonly fixed in each system. (4 Marks each)
- i. A natural veld ecosystem in the Eastern Cape
 - ii. An irrigated alfalfa field at University of Fort Hare Dairy farm
 - iii. A pea field in Alice
 - iv. A tropical rain forest in Brazil
 - v. A soybean field in Butterworth

QUESTION THREE (25 MARKS)

- (a) Describe the main functions of N, P, and K in plants and indicate the main forms in which each of these elements can be taken up by plants (15 marks)
- (b) In what pH range is phosphorous the most available to plants? Why is it unavailable at pH values above and below this range (5 marks)
- (c) Explain why applied phosphorus tends to remain at the soil surface in no-till farming situations, while applied nitrogen will redistribute through the rooting depth. (5 marks)

QUESTION FOUR (25 MARKS)

- a. What plant nutrient elements are classified as micronutrients? Explain the primary role of micronutrients in plants. (5 marks)
- b. What are the ionic forms of the different micronutrients in soil solutions? How do their availability change with pH? (10 marks)
- c. Comment on the statement that “ a fertile soil may not necessarily be productive”. (10 marks)