Uganda Martyrs University
Faculty of Agriculture

B. Agriculture I Semester II Final Exams: 2020/2021

Course Unit: SPN 1102: Soil Fertility and Plant Nutrition

Date Issued 30th June, 2021
Date and Time of Submission: 30th June, 2021 at 3.30 pm

Instructions:

i. Answer any 4 of the following 8 questions
ii. *Save your work in MS Word and the name of your file should be your* ***REGISTRATION NO.***
iii. *Do not write your names anywhere on the answer sheets. Use only your registration no.*
iv. *Send your work to jbyalebeka@umu.ac.ug*

1a) What are the key characteristics / properties of (i) a fertile soil, (ii) a productive soil? **(20 marks)**

b) Give five reasons why most soils in Uganda are only fairly productive for short periods (1-3 years) after bush clearing. **(5 marks)**

2 There are over 100 chemical elements in nature, yet scientists have established that only 17 of them are essential for plant growth.

a) State the criteria (tests) that an element needs to pass or meet before it is classified as essential for plant growth. **(9 marks)**

b) Discuss a simple experiment that you would carry out to fully prove that a particular element is essential for plant growth. **(16 marks)**

3a) Discuss **five (5)** ways through which plant nutrients are added to the soil on a typical smallholder farm in in your home area and **five (5)** processes through which nutrients are lost from the soil on the same farm. **(20 marks)**

b) In your view is there a nutrient balance (additions = losses) on such a farm and if the answer is no, what does that mean? **(5 marks)**

4) Besides nutrient elements, there are 5 other external environmental factors that influence plant growth. It is well known that plant growth is dependent upon a favourable combination of these 6 factors and that any one of them, if out of balance with the others, can reduce or even entirely prevent the growth of plants. Furthermore, the factor which is least optimum determines the level of crop production.

a) Name those **five (5)** other external environmental factors that influence plant growth and briefly explain the role that each plays in supporting plant growth.**(10 marks)**

b) Explain clearly what is meant by the statement "the factor which is least optimum determines the level of crop production". **(15 marks)**

5 The New Vision Newspaper of Friday 25th June, 2021 (last week) reported that **"Dr. Kabiri (she works in NARO) said globally, farmers apply 135kg of fertilizer per hectare. In Africa, farmers apply 17kg per hectare, while in Uganda farmers apply just 1.3kg per hectare"**.

a) What is your take on this Dr. Kabiri's statement as far as agricultural production in Africa and Uganda in particular is concerned? **(15 Marks)**

b) Explain the three major roles played by mineral nutrients in plants. **(10 Marks)**

6a) Discuss the various methods of classifying plant nutrients and explain why they are classified that way. **(15 marks)**

b) Explain why the concentrations of plant nutrients both in soils and plants are presented either in **percentages** or in **ppm** and what is the relationship between these two measures?

7 Plants need 17 elements, called nutrients, and several other environmental factors to grow and complete their life cycles. Yet most farmers apply only three nutrient elements as fertilizers to their crops. Explain clearly why farmers rarely pay attention to the other 14 nutrient elements and environmental factors when they are managing crops. **(25 marks)**

8a) Discuss in detail the process of making compost manure up to the point it is ready for use. **(20 marks)**

b) Explain why compost manure is rarely made and used by most farmers.