



1ST SEM. 2012/2013 (M)

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UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

**PROGRAMMES: BACHELOR OF SCIENCE YEAR THREE IN
AGRICULTURAL EDUCATION, AGRONOMY AND
HORTICULTURE**

COURSE CODE: CP 302

TITLE OF PAPER: CROP NUTRITION

TIME ALLOWED: TWO AND A HALF (2.5) HOURS

**INSTRUCTIONS: ANSWER FOUR (4) QUESTIONS WITH AT LEAST
TWO (2) QUESTIONS FROM EACH SECTION**

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GRANTED BY THE CHIEF INVIGILATOR**

SECTION 1: SOIL CHEMISTRY

QUESTION 1

(a) Discuss the acid-infertility of soils. **[15]**

(b) Highlight the management strategies you would recommend to increase crop yields in acid soils **[4]**

(c) An acid soil in the Middleveld of Swaziland was found to contain 4 m.e. exch. Al^{3+} per 100g soil. Calculate the amount of $CaCO_3$, in tonnes per hectare, required to neutralize the exchangeable Al^{3+} to a depth of 15cm. The soil has a bulk density of 1.2 Mg/m^3 and the $CaCO_3$ has a neutralizing value of 95%. **[6]**

QUESTION 2

(a) Discuss the interactions of anions with sesquioxides in tropical and subtropical soils. **[15]**

(b) Highlight the implications of such interactions on plant nutrition **[5]**

(c) How can such interactions be minimized? **[5]**

QUESTION 3

Discuss, in detail, the contributions of soil organic matter to the quality of the environment. **[25]**

SECTION 2: SOIL FERTILITY

QUESTION 4

(a) Discuss the factors which influence the availability of phosphorus to plants in soils [15]

(c) What strategies would you recommend to improve phosphorus availability to plants in soils? [5]

(d) An analysis of a soil revealed that it had a phosphorus content of 8 mg per kg soil and the phosphorus sufficiency level for most crop plants is 20 mg per kg soil. It is known that the efficiency of conversion of fertilizer P to soil P is 20%. Calculate the amount of triple superphosphate (22% P) that is required to increase soil P to the sufficiency level. [5]

QUESTION 5

(a) Outline the various ways in which nitrogen may be added to soils for optimum growth of plants. [16]

(b) Discuss the interventions you would recommend to enhance the efficiency of nitrogen uptake and utilization by plant in different soil types. [9]

QUESTION 6

Discuss the role of micronutrients in crop production [25]