

National University of Lesotho
Faculty of Agriculture
Department of Soil Science and Resource Conservation
SSR 412: Soil Fertility Evaluation and Management

Programme: BSc. Agriculture (Soil Science)
Year 4

December 2017

100 marks

3 Hours

Instructions

1. Answer any three (3) questions from Section A
 2. Section B is compulsory
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Section A: Answer any three (3) questions

Question 1 [25 marks]

a) Define the following: [2 marks each]

- i. Nutrient mining
- ii. Soil fertility evaluation
- iii. Response curve

b) Describe Blackman's experiment and how it relates to Liebig's law of the minimum [11 marks]

c) Discuss with illustrations, any two (2) factors that affect the shape of a response curve. [8 marks]

Question 2 [25 marks]

a) Describe the concept of hidden hunger and indicate its implication on the use of deficiency symptoms to evaluate soil fertility. [4 marks]

b) With examples, discuss four (4) disadvantages of nutrient deficiency symptoms as soil fertility evaluation tool. [12 marks]

c) Name three (3) classes of biological method of indices of nutrient availability [3 marks]

d) Describe the use of Neubauer method to obtain biological nutrient availability index. [6 marks]

Question 3 [25 mark]

- The rate of nutrients release from soils is a two way process. Elaborate this statement [4 marks]
- Explain three (3) ways by which plant nutrients move in the soil. [6 marks]
- Discuss integrated nutrient availability factors and their significance in soil test [10 marks]
- What is the critical soil test value? [3 marks]
- What is the critical soil test value in Figures A and B? [2 marks]

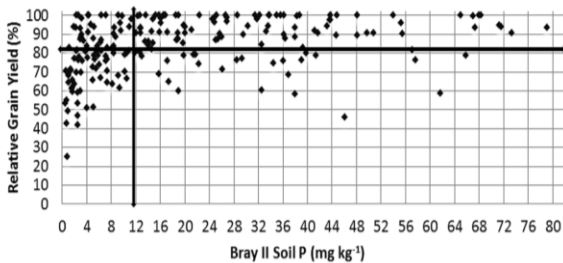


Figure A

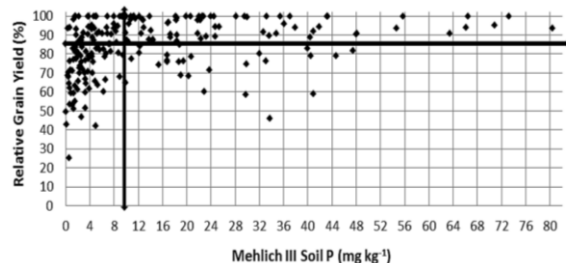


Figure B

Question 4

- Differentiate between chemical and biological lime requirement [4 marks]
- Describe one buffer method used in the determination of lime requirement [9 marks]
- Discuss three (3) processes that release hydrogen (H^+) ions to develop active acidity in the soil [9 marks]
- Name three (3) quality factors that affect the quantity of lime required [3 marks]

Section B: Compulsory

Question 5 [25 marks]

A case of two farmers was presented to you as follows: both farmers are involved in commercial farming, Farmer A is interested in consistent economic returns over a long term while Farmer B wants profitability in any given year. If you were to recommend fertilizer application to these two farmers, which fertilizer recommendation philosophy would you advise each farmer to adopt and why. **[25 marks]**