



University of Fort Hare
Together in Excellence
Department of Agronomy

AGH 615: SUPPLEMENTAR EXAM

September 2018

TIME: 3 HOURS

SUBJECT: HORTICULTURAL SCIENCE

MARKS: 100

PAPER: ADVANCED TOPICS IN HORTICULTURAL SCIENCE

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EXTERNAL EXAMINER: PROF. P. SOUNDY

INSTRUCTIONS:

1. ANSWER ANY FIVE (5) QUESTIONS.
2. THIS DOCUMENT CONTAINS TWO PAGES INCLUDING THE COVER PAGE.

QUESTION 1 (20 MARKS)

Compare in detail carbon fixation in C₃, C₄ and CAM plants and elaborate on anatomical differences amongst the three plant groupings. [20]

QUESTION 2 (20 MARKS)

- a) Source-sink relationships in plants depend on nutrient availability, soil moisture level and prevailing climatic conditions. Discuss effects of nitrogen, light and temperature on the balance between growth and differentiation, and state crop managements used to maximize yield/quality. Substantiate your discussion by taking sugar beet and sweet melon as examples. [10]
- b) Illustrate (sketch) the ideal plant growth curve and discuss the different phases. [10]

QUESTION 3 (20 MARKS)

What factors affect growth of roots? Explain how root growth is affected by the factors that you mention and discuss how this impacts crop yield. [20]

QUESTION 4 (20 MARKS)

Explain how plants move assimilates from source to sink. How do plants partition assimilates during vegetative and reproductive growth phases? [20]

QUESTION 5 (20 MARKS)

- a) Explain whole plant responses to drought in terms of growth, and chemical signaling between the root and shoot. [10]
- b) Some plants resist drought by limiting transpirational water loss to prevent development of detrimental water deficits. Such plants are commonly referred to as water savers. Elaborate on five ways in which such plants are able to conserve water. [10]

QUESTION 6 (20 MARKS)

- a) Elaborate on the thermoperiodic requirements of crop plants, giving examples where possible. [6]
- b) What is apomixis? Furthermore, indicate the potential impact of this mode of reproduction if applied to production of hybrid varieties of staple food crops in tropical agriculture. [4]
- c) Define the term 'fruit set', and elaborate on some of the causes for its failure? [6]
- d) Elaborate on the role played by any two growth hormones that are involved in fruit growth and development. [4]

QUESTION 7 (20 MARKS)

- a) Keeping in mind that different citrus cultivars respond to temperature differently at different fruit growth and development stages, elaborate the reason why (i) navel orange does well in the Eastern Cape, (ii) Valencia almost all over South Africa and (iii) grape fruit limited to the Limpopo and Mpumalanga hot/warm regions. [15]
- b) Elaborate that night temperature determines fruit size and fruit sugar content. [5]

QUESTION 8 (20 MARKS)

Highlight the purposes of (a) canopy pruning and training, (b) fruit thinning, (c) girdling, and (d) fertilizer management to manipulate source-sink relationship in favour of high fruit yield and quality in a sustainable manner in fruit trees.