

UNIVERSITY OF SWAZILAND

MAIN EXAMINATION PAPER 2013

TITLE OF PAPER : PLANT PHYSIOLOGY

COURSE CODE : B402

TIME ALLOWED : THREE HOURS

INSTRUCTIONS :

1. SECTION A CARRIES 40 MARKS AND IS **COMPULSORY**
2. CHOOSE ANY **TWO** QUESTIONS FROM SECTION B, EACH OF WHICH CARRIES 30 MARKS
3. REMEMBER TO USE APPROPRIATE TERMINOLOGY AND ILLUSTRATIONS.

SPECIAL REQUIREMENTS: NONE

**THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN
GRANTED BY THE INVIGILATORS**

SECTION A: COMPULSORY QUESTION

QUESTION 1

- (a) An experiment conducted on a certain plant finds that its tissue neither gains nor loses weight when equilibrated with a 0.5 molal sucrose solution and when placed in a 0.7 molal sucrose solution, incipient plasmolysis occurs. Estimate the values of Ψ_{cell} , Ψ_{S} , and Ψ_{P} for the tissue. (15 marks)
- (b) Discuss the xylem as a water transportation structure in plants. (9 marks)
- (c) Briefly discuss how mycorrhizae assist in plant nutrient element uptake. (10 marks)
- (d) List 6 micronutrients that are essential for growth of higher plants. (6 marks)
- (40 marks)**

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 2

- (a) Discuss the concept of water potential and how it helps the plant physiologist explain water movement? (13 marks)
- (b) Distinguish between simple diffusion, facilitated diffusion, and active transport (9 marks).
- (c) Which mechanisms would most probably account for:
- i. entry of a small lipid-soluble solute;
 - ii. extrusion of sodium ions leaked into a cell;
 - iii. rapid entry of a neutral hydrophilic sugar;
 - iv. accumulation of potassium ions?
- (8 marks)
(30 marks)

QUESTION 3

- a) Describe the photorespiratory pathway and its relationship with photosynthesis? (10 marks).
- b) Discuss stomatal regulation of transpiration. (10 marks)
- c) Briefly discuss carbon assimilation in plants. (10 marks)
- (30 marks)**

QUESTION 4

Discuss the synthesis, transportation and utilization of auxins, gibberellins and abscisic acid in plants.

(30 marks)

QUESTION 5

- (a) Briefly explain the C3, C4 and CAM photosynthetic pathways. (15 marks)

- (b) Discuss the adaptations of desert plants to arid conditions. (9 marks)
- (c) Explain the two kinds of problems that plants face when growing in high salinity soils. (6 marks)

(30 marks)