"Investing in Africa's future"

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

ACP 304: PLANT PATHOLOGY

END OF SECOND SEMESTER FINAL EXAMINATIONS

MAY/JUNE 2020

LECTURER: W. MANYANGARIRWA

DURATION: 48 HRS

INSTRUCTIONS

ANSWER ONE QUESTION ONLY

YOUR ANSWERS SHOULD BE TYPED

ANSWER ONE QUESTION ONLY

EACH QUESTION IS WORTH 100 MARKS

1. Uhuru Plant Diagnostics is a consultancy company that deals with plant disease diagnosis in Kenya. Farmers in Machakos district noticed a rare, new plant disease on their barley variety KARI 77 and they sent leaf samples for disease diagnosis. The company promised to give the results within four weeks after completing the all the necessary diagnostic procedures.

   a) Explain how the company is supposed to handle the leaf samples submitted by the farmers. [10 marks]
   b) Give a concise outline of the procedures that must be followed to diagnose the cause of the disease. In your answer discuss the challenges that can be met in proving the cause of the disease. [30 marks]
   c) Explain some of the human factors that could have contributed to the outbreak of the disease. [30 marks]
   d) The company is suspecting that the disease was caused by a seed-borne fungus. Outline the laboratory tests that can be conducted on the barley seeds to prove that the fungal disease is indeed seed-borne. [30 marks]

2. The Government of Denmark, through the Danish International Development Assistance (DANIDA) provided a grant of Danish Kroner DKK 21 million (US$3 million) to set up a Plant Quarantine station with fully equipped laboratory infrastructure in the newly independent state of South Sudan. The station will serve export farmers as well as local farmers since there are no established disease diagnosis facilities in the country.

   As an expert in plant quarantine draw up a work plan of setting up the facility in terms of justification, materials and equipment required to handle and diagnose plant diseases as well as the human resource training needs for the new station. [100 marks]

3. Read through the following case and answer the questions that follow:

   Large scale soybean growers in Mazowe District of Zimbabwe have noticed a new rust-like disease in the 2019/20 summer season. They took leaf samples to the plant disease clinic and the clinic officer simply looked at the leaves and informed them not to worry because the disease in his view was not new at all. He told them that

the disease was called bacterial pustule and he advised them to spray a copper based fungicide which also works as a bactericide to control soybean bacterial pustule. The farmers sprayed the recommended copper oxychloride but the problem did not end, in fact the problem intensified.

They took leaf samples again to the plant disease clinic and that is when the clinic officer noted that indeed this could be a new disease which needed a thorough and systematic identification procedure.

a) Explain the possible steps and laboratory procedures that the plant disease clinic officer should take in order to diagnose and confirm the identity of this new fungal disease. [30 marks]

b) The soybean breeder at the Crop Breeding Institute wanted to evaluate the resistance of seven new soybean accessions to the new disease. Explain how he can set up a field experiment to measure the levels of resistance in the different accessions. In your answer, pay attention to the methods and tools used in measuring the level of disease. [40 marks]

c) When the causative agent of the new disease was finally identified and confirmed, it was noted that there were no resistant soybean varieties on the market. The immediate solution was for farmers to use fungicides.

Develop a detailed guideline on possible fungicide groups that can be used and how the fungicides should be used in a manner that reduces chances of the fungus developing resistance to the fungicides. [30 marks]

END OF EXAMINATION PAPER