



**RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES, MIHINTALE**

**B.Sc. (General) Degree in Applied Sciences
Third year – Semester I Examination – October/November 2015**

BOT 3104 -PLANT PATHOLOGY

Time: One and half hours

PART A

Answer all questions.

1. **True/False questions.** Please read each statement carefully, then on the blanks provided, place a 'T' if the statement is true or an 'F' if the statement is false.

- a) Bacterial disease symptoms usually include a slimy texture, rotten odour and spots on leaves that appear to run in irregular patterns.

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- b) Signs are the modified appearance of an infected plant, such as necrotic tissue, chlorosis, cankers or galls.

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- c) Antagonistic soils contain higher than normal numbers of plant pathogens.

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- d) Crop rotation is less successful if the pathogen is able to survive in a long lived dormant state or can survive as a saprophyte until it detects a suitable host plant.

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- e) Fungi almost always produce spore bearing structures on or near the plant epidermis so that the germinating spores will be easily dispersed.

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- f) Soft rot pathogens typically use growth regulators to obtain nutrition from fruits and vegetables.

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- g) The feedback effect occurs when enzymes released by a pathogen break down plant substances and the latter products trigger mass production of the enzyme.

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- h) The hypersensitive response is when a plant rapidly synthesizes substances to reinforce cell walls to make penetration of the pathogen more difficult.
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- i) Horizontal resistance is a lower level of resistance to any specific race of pathogen but effective against a larger number of pathogens.
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- j) 'Plant does not develop disease from soilborne pathogen because the seeds germinate faster than others and before the temperature becomes favourable for the pathogen to attack.'

The above scenario is a typical example of Tolerance to disease in plants.

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(1.5x10=15 marks)

2. a) The following is a table of disease reactions on a set of different cultivars of rice inoculated with several isolates of *Magnaporthe oryzae* which causes leaf and collar blast. S= susceptible host cultivar and R= resistant host cultivar. For each cultivar only the dominant R gene alleles are shown.

Differential host cultivar (Genotype)	Isolates of <i>Magnaporthe oryzae</i>								
	1	2	3	4	5	6	7	8	9
A (R_1R_1)	S	R	R	R	R	S	R	S	R
B (R_3R_3)	S	S	S	S	S	R	S	S	S
C (R_5R_5)	S	R	R	R	R	S	S	R	R

- i. How many races of rice blast are shown in the above selection?
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- ii. What would be the theoretical maximum number of races we could detect with three R genes?
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- iii. From the information provided in the above table, indicate on the table below the type of reaction these same isolates would produce on the following host.

Differential host cultivar (Genotype)	Isolates of <i>Magnaporthe oryzae</i>								
	1	2	3	4	5	6	7	8	9
D (R_1R_1, R_3R_3)									
E (R_3R_3, R_5R_5)									

- iv. Isolate 8 only produced a hypersensitive response on the cultivar 'C'. Briefly define what hypersensitive reaction is.

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- b) Give a concise account on the importance of Type IV secretion system in aiding the ability of bacteria to cause disease in plants.

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(25 marks)

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p.t.o. →

PART B

Answer any two (02) questions of your choice.

3. a) What are the two major types of microbial toxins the pathogens deploy to attack host plants?
b) Clarify the significance of diversity of pectinases and pectolytic enzymes and their mechanism of action which facilitates the invasion of the host plant in disease development.
4. Using accurate examples discuss how the agriculture industry can benefit from modern day biotechnology with special reference to molecular approach in plant disease diagnosis.
5. Write short notes on;
 - a) infection process of *Agrobacterium tumefaciens* in Crown gall disease development
 - b) effect of pathogens on photosynthesis and water & nutrient translocation of plants
 - c) primary events of a disease cycle

(30x2 = 60 marks)