OCR
Oxford Cambridge and RSA

A Level Biology A

H420/02 Biological Diversity

Question Set 3

1 The potato plant, *Solanum tuberosum*, is a staple food plant in many parts of the world.

Potatoes are susceptible to infection by a pathogen called *Phytophthora infestans*, which causes adisease known as potato late blight. The most visible sign of the disease is a brown discolourationof the leaves.

Some varieties of potato are resistant to infection by *P. infestans*.

(a) State **two** ways in which an individual *S. tuberosum* plant could respond to infection by *P.infestans*. **[2]**

production of toxic chemical or production of callose

(b) The resistance of different varieties of *S. tuberosum* to infection by *P. infestans* was investigated.

- Three different clones, A, B and C, of *S. tuberosum* were used.
- The clones were grown in adjacent fields over the same time period.
- The percentage of leaf area affected by the disease was estimated at regular intervals.

The results are shown in Fig. 18.

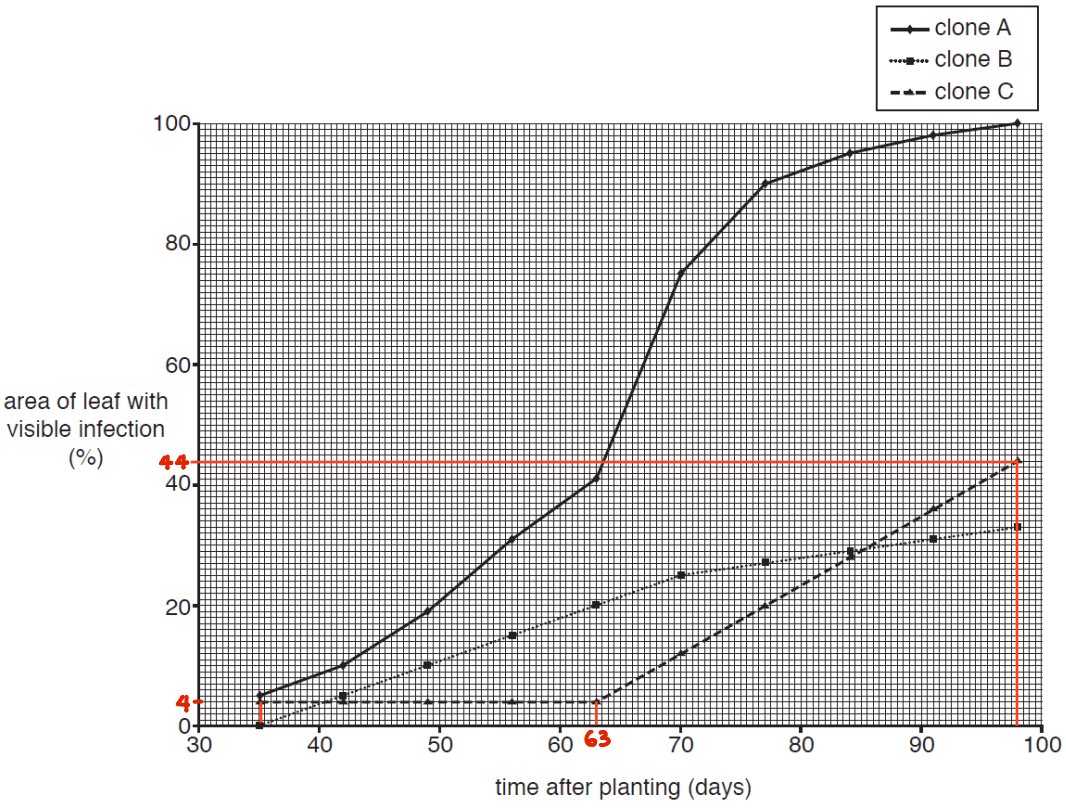

Fig. 18

(i) Suggest why it is important to use clones in an investigation such as this. **[2]**

To reduce genetic variation and to increase validity

(ii) State how a clone of potatoes could be produced for this investigation and explain why itis important to carry out this procedure under aseptic conditions.

procedure tissue culture

asepsis is important because it reduces contamination [2]

(iii) The extent of infection is estimated by comparing the area under the curve from the graph. The area under the curve for clone **B** is 1250. (Units can be ignored in this instance.)

Using Fig. 18, calculate the approximate area under the curve, between day 35 and day98, for clone **C**.

$(63-35)\times 4 + (4+44)\times(98-63)/2$ *Answer* 952 [3]

$= 112 + 840 = 952$

(iv) Calculate the area under the curve for clone **C** as a proportion of the area under the curve for clone **B**.

$\frac{952}{1250} = 0.7616$

$\simeq 0.762$

Answer 0.762 [1]

(v) **Using Fig. 18**, suggest why the area under the curve is used as a measure of infection rather than the area of leaf that is visibly affected on a given day.

[2]

The area under the curve shows the total infection over time which is more reliable than choosing a day as the level of infection could be significantly different. All the clones show great increase in the infected area after day 63. Before day 63, clone B had greater area than clone A. However after 85 days, the infected area in clone A exceeded clone B's infected area.

(vi) The clones were planted in adjacent fields in order to control variables such as temperature, wind speed and rainfall.

Suggest two other abiotic variables that this precaution was intended to control.

light intensity

soil pH [2]

Total Marks for Question Set 3: 14