

**A Level Biology A**  
**H420/01 Biological Processes**

**Question Set 6**

6 (a)

Plant hormones affect the growth of plant tissues in different ways.

One such effect is to promote the formation of seedless fruit.

Cytokinins are a group of plant hormones.

A commercial plant hormone firm carried out research into three different cytokinins: kinetin, zeatin and diatin.

The firm investigated the effect of adding different volumes of each cytokinin on the production of seedless fruit.

The cytokinins were sprayed on the flowers of different plants. Over time, the mass of seedless fruits produced by the plants was measured.

Fig. 21 is a summary of their results.

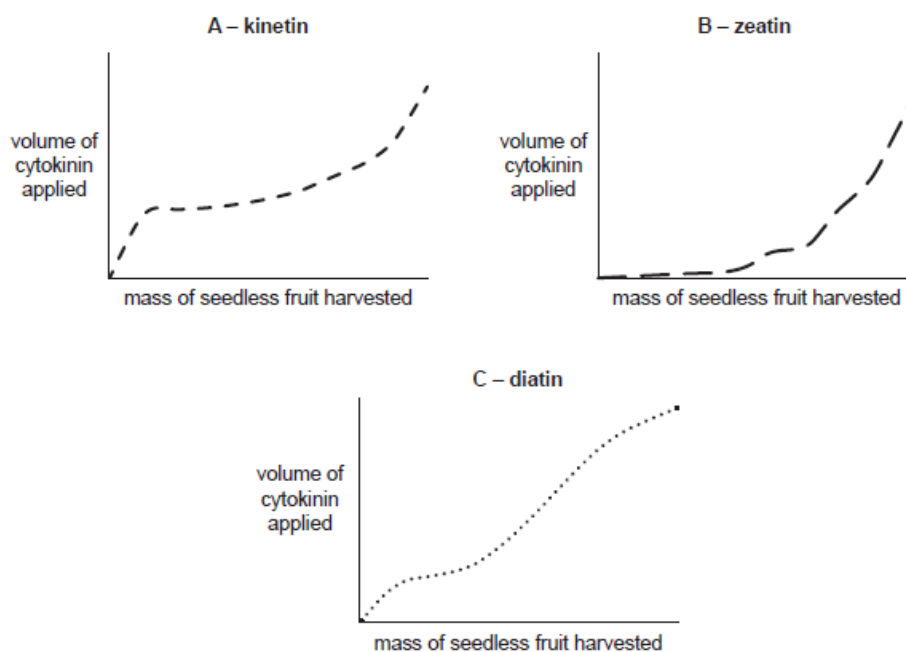


Fig. 21

On the basis of these results, the firm decided to use diatin in their new plant spray. The firm made the following claim on their packaging:

*Diatin is scientifically proven to cause production of seedless fruit when applied to flowers.*

Evaluate the firm's claim, using the evidence in Fig. 21.

[6]

The firm is correct in that, as the volume of diatin applied increases, the mass of seedless fruit harvested increases. However, the data is not displayed properly which brings into question the validity of the results and potential bias of the company. The axes on the graph are the incorrect way around. The dependent variable, mass of seedless fruit harvested, should be displayed on the y-axis. There is also no scale on the graph, nor units on the labels of the axes. It is therefore impossible to determine the extent of the relationship between the variables. Furthermore, correlation does not imply causation. Other factors, such as the volume of water applied, may be involved. Without knowledge of the method (which is not specified) the validity of the results cannot be determined. For example, there is no mention of control variables, soil type, location of growth, hormone concentration etc. Additionally, the firm's claim states that diatin is effective in 'flowers' but doesn't state which flowering plant species the research was carried out on. The claim is thus not valid.

6 (b)

Another response affected by plant hormones is phototropism.

A student completed an investigation into phototropism in cress seeds. This was the method used:

- Place 50 cress seeds (*Lepidium sativum*) on a sterile paper towel in a petri dish.
- Water with 10 cm<sup>3</sup> of distilled water.
- Repeat for 3 different sets of seeds:
  - Set 1 is placed in a box to prevent light shining on the seeds.
  - Set 2 is placed in a box with light from above only.
  - Set 3 is placed in a box with light from the right hand side only.
- Keep all 3 sets at 25 °C.
- After 72 hours, remove 20 of the seedlings from each set and count how many have bent.

Identify **two** limitations of the student's method.

For each limitation, explain how it limits the validity of conclusions that can be drawn **and** suggest an improvement that would improve the validity of conclusions made.

limitation 1: ~~Trials were not repeated.~~.....

explanation: ~~Means cannot be calculated nor anomalies identified.~~.....

improvement: ~~Repeat the experiment at least a further two times.~~.....

limitation 2: ~~No method is outlined for selection of the 20 seedlings.~~.....

explanation: ~~Non-random selection may lead to biased results.~~.....

improvement: ~~Random selection e.g. number seedlings and select using random number generator.~~..... [6]

**Total Marks for Question Set 6: 12**

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