1. Nov/2021/Paper_41/No.5

(a) Gibberellin is a plant growth regulator involved in barley seed germination. Production of gibberellin is stimulated by the uptake of water.

State the location of gibberellin synthesis in a barley seed during germination.

..... [1]

(b) Barley seeds germinate when placed on blotting (absorbent) paper soaked in water.

The germination of barley seeds placed on blotting paper soaked in solutions of different water potential was investigated.

The success of germination was measured as a germination index for:

- barley seeds placed on blotting paper soaked in water
- barley seeds placed on blotting paper soaked in 5 solutions of different water potential.

The results are shown in Fig. 5.1.

The higher the germination index value, the more successful the germination of the barley seeds.

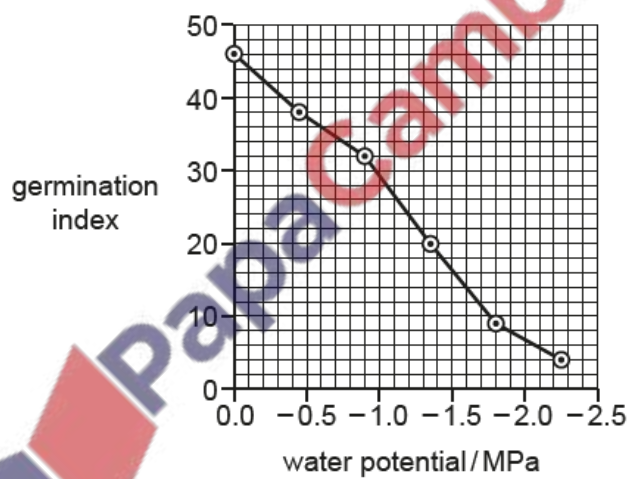

Fig. 5.1

(i) With reference to Fig. 5.1, describe the relationship between the germination index of barley seeds and water potential.

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..... [2]

(ii) Suggest explanations for the relationship shown in Fig. 5.1.

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..... [3]

(c) During barley seed germination, gibberellin stimulates the synthesis of enzymes.

State the name of one of these enzymes **and** the precise location of its synthesis.

enzyme .....

location .....

[2]

(d) Some plants are grown commercially for their flowers. Many of these plants are varieties that have short stems.

Two factors that affect the height of stems are:

- gibberellin
- the *Le*/*le* gene.

The *Le*/*le* gene has two alleles, Le and le.

(i) Suggest an advantage of growing a short-stemmed variety of a flowering plant.

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..... [1]

(ii) Explain how the *Le*/*le* gene and gibberellin are involved in affecting the height of plant stems.

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..... [3]

[Total: 12]

2. Nov/2021/Paper_41/No.10

(a) Describe **and** explain the transmission of an action potential in a myelinated neurone. [9]

(b) Explain what is meant by homeostasis in a mammal **and** explain why it is important to maintain body temperature, blood glucose concentration and the water potential of blood. [6]

[Total: 15]

3. Nov/2021/Paper_42/No.3

During the germination of barley seeds, amylase is produced.

(a) Describe the sequence of events that lead to the production of amylase during germination of barley seeds.

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..... [3]

(b) Malting is a process involved in the production of a drink called beer. During malting, barley seed germination is controlled so that the sugars produced during germination can be used in the production of beer.

Fig. 3.1 shows two features of a germinating barley seed during the first five days of malting:

- activity of the amylase enzyme
- the percentage of starch reserves remaining in the barley seed.

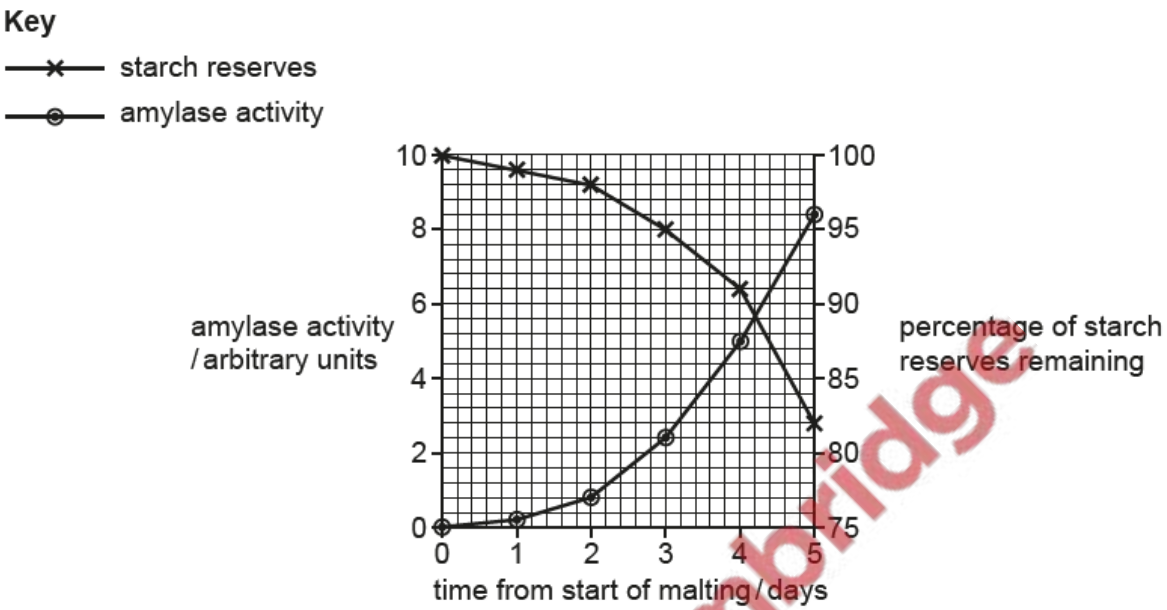

Fig. 3.1

(i) State the precise location of the starch reserves in the barley seed.

..... [1]

(ii) With reference to Fig. 3.1, describe **and** explain the effect of malting on amylase activity and the percentage of starch reserves remaining in the germinated barley seed.

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..... [4]

(c) In the malting process, germination is stopped before the concentration of sugars in the germinating barley seeds exceeds a concentration that causes shoot or root growth.

Drying the germinating barley seeds at 50 °C is one method used to stop malting.

(i) Explain how this method would stop malting.

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..... [3]

(ii) Suggest why malting is stopped before shoot or root growth occurs.

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..... [1]

[Total: 12]

4. Nov/2021/Paper_42/No.9(b)

(b) Describe the structure of a motor neurone. [6]

5. Nov/2021/Paper_42/No.(a, b)

(a) Explain how dip sticks function to test for glucose in a sample of urine. [7]

(b) Explain the control of gibberellin synthesis **and** outline how gibberellin stimulates stem elongation. [8]

[Total: 15]