

3 (a) Describe the pathway a water molecule takes from the soil to reach the xylem.

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(b) A student investigated the effect of temperature on transpiration.

The student collected four small plants and placed them in beakers filled with water.

Fig. 3.1 shows the apparatus used.

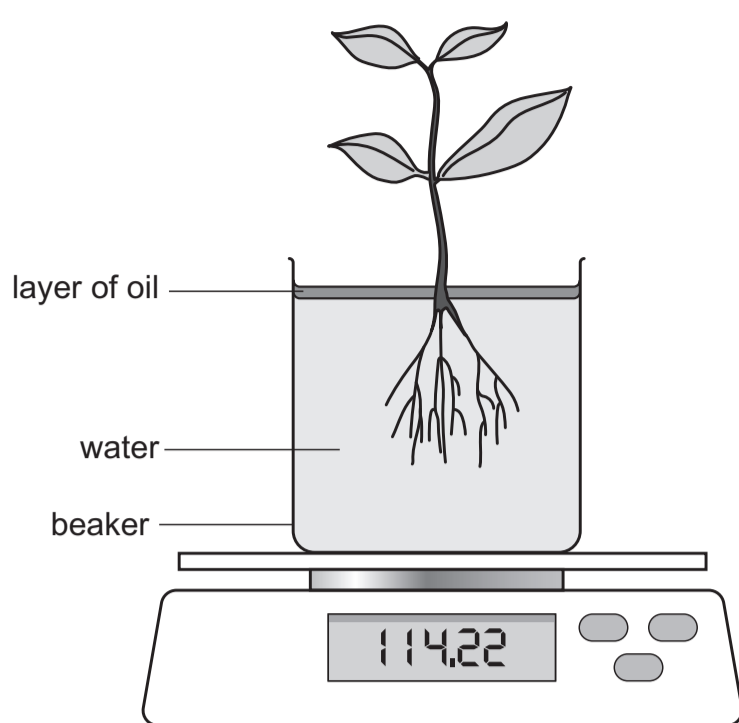


Fig. 3.1

For each plant, the student measured the initial masses of the equipment, water and plant.

Each plant was placed in a different temperature-controlled room for three hours.

After three hours, the student measured the final masses of the equipment, water and plants.

The results are shown in Table 3.1.

Table 3.1

temperature / °C	initial mass / g	final mass / g	transpiration rate / g per hour
15	138.2	135.5	0.9
20	136.1	132.5	1.2
25	137.8	128.5	3.1
30	135.7	118.3	

(i) Using the information in Table 3.1, calculate the transpiration rate in the plant kept at 30 °C.

..... g per hour [1]

(ii) Describe **and** explain the difference in the results for the plants kept at 15 °C and 25 °C.

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(iii) The investigation was repeated with a plant kept at 25 °C in a lower humidity environment. Predict the effect of these conditions on the transpiration rate.

Explain your prediction.

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(iv) Complete the sentences about water movement through the xylem.

The xylem transports water and .....

Xylem cells form a long continuous ..... with thick walls

containing cellulose and .....

Water moves upwards in the xylem because of transpiration .....

This draws up a ..... of water molecules, held together by

..... between water molecules.

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(c) (i) Explain why wilting occurs.

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(ii) Marram grass, *Ammophila arenaria*, is a xerophyte.

Fig. 3.2 is a photomicrograph of a cross-section of a marram grass leaf.

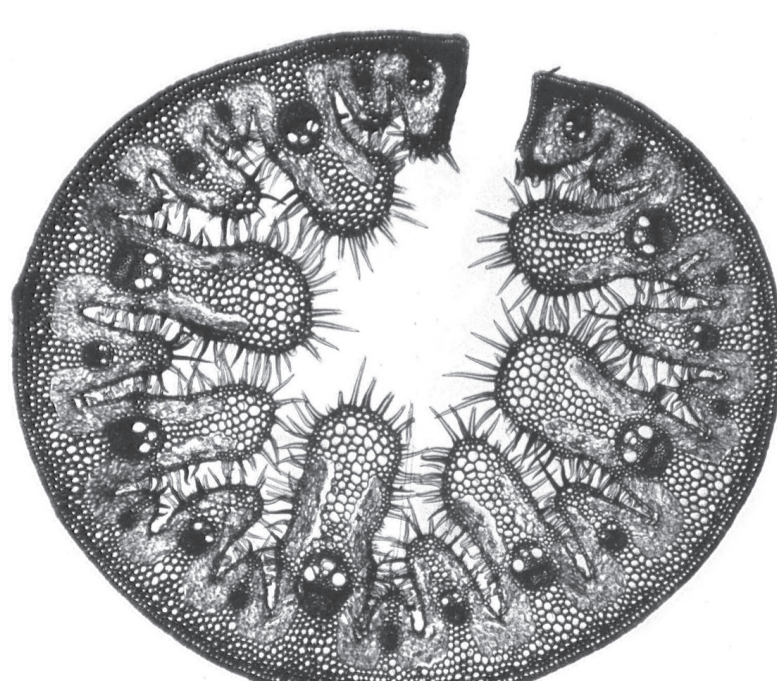


Fig. 3.2

Explain **one** way that the marram grass leaf shown in Fig. 3.2 is adapted to reduce transpiration.

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