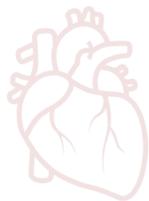


Plant Nutrition

Dr. MOHAMED IBRAHIM



TEAM
BIOCARDIA

Plant Nutrition

2 plants produce glucose in leaves and convert some of it to sucrose.

(a) (i) explain how glucose is produced in leaves.

.....

.....

.....

.....

..... [3]

0610/43/ / /1

2 (a) State the **word** equation for photosynthesis.

..... [2]

(b) Scientists investigated the effect of light intensity on the rate of photosynthesis in the leaves of eucalyptus trees at two different concentrations of carbon dioxide, **A** and **B**.

The results are shown in Fig. 2.1.

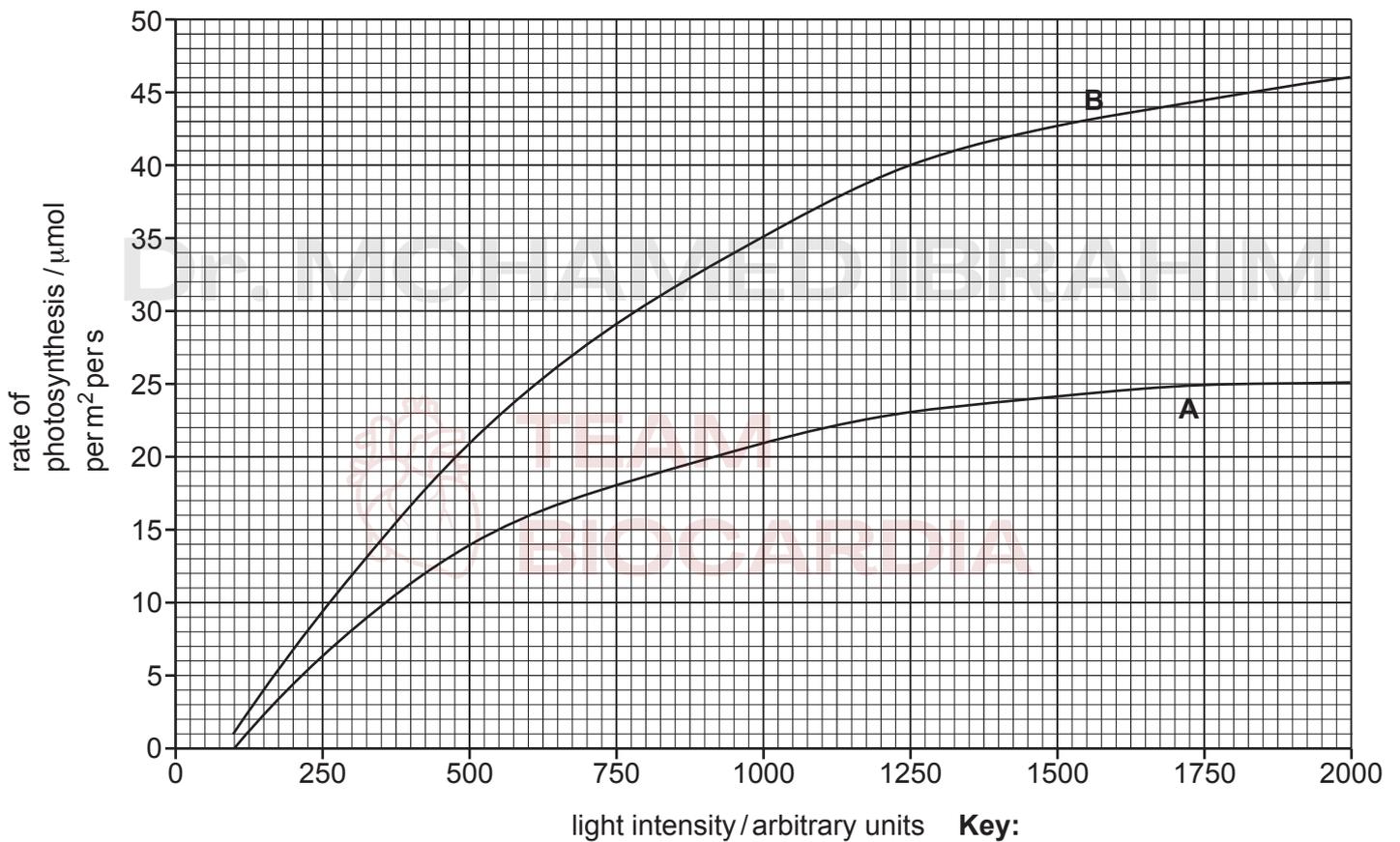


Fig. 2.1

0610/43/M/J/19

Key:
A carbon dioxide concentration 140 ppm
B carbon dioxide concentration 1000 ppm

Plant Nutrition

- (i) Suggest **and** explain why the scientists kept the temperature of the leaves at 20°C while they recorded results.

.....
.....
.....
.....
..... [2]

- (ii) Calculate the percentage increase in the rate of photosynthesis at a light intensity of 1250 arbitrary units when the carbon dioxide concentration was increased from 140 ppm to 1000 ppm.

Show your working and give your answer to the nearest whole number.

..... %
[3]

- (iii) Describe the effect of increasing light intensity on the rate of photosynthesis when the concentration of carbon dioxide was 140 ppm.

.....
.....
.....

Dr. MOHAMED IBRAHIM



TEAM
BIOCARDIA

..... [3]

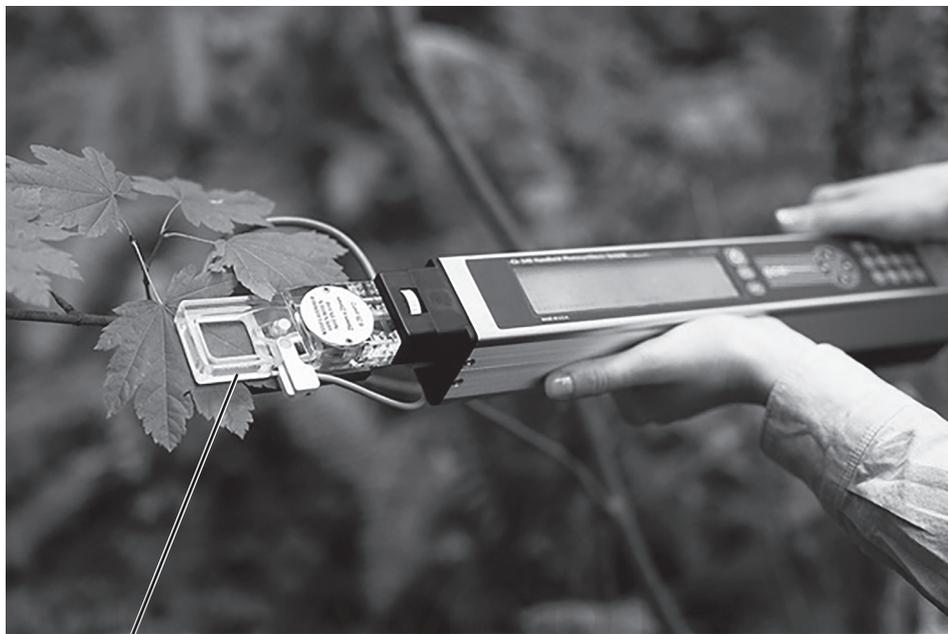
Plant Nutrition

2 The rate of photosynthesis of terrestrial plants can be determined by measuring the uptake of carbon dioxide.

(a) Explain why plants take up carbon dioxide during photosynthesis.

.....
.....
.....
.....
..... [2]

(b) The rate of photosynthesis of parts of individual leaves can be measured using a hand-held device as shown in Fig. 2.1.



transparent chamber

Fig. 2.1

This apparatus allows air to flow through the transparent chamber that encloses part of the leaf. The apparatus measures the carbon dioxide concentration of the air entering and leaving the chamber.

Explain how the results from the apparatus can be used to calculate the rate of photosynthesis.

.....
.....
.....
..... [2]

Plant Nutrition

- (c) A student used the apparatus shown in Fig. 2.1 to investigate the effect of temperature on the rate of photosynthesis of the leaves of Chinese plantain, *Plantago asiatica*, at two different concentrations of carbon dioxide, **A** and **B**.

Fig. 2.2 shows the results of the investigation.

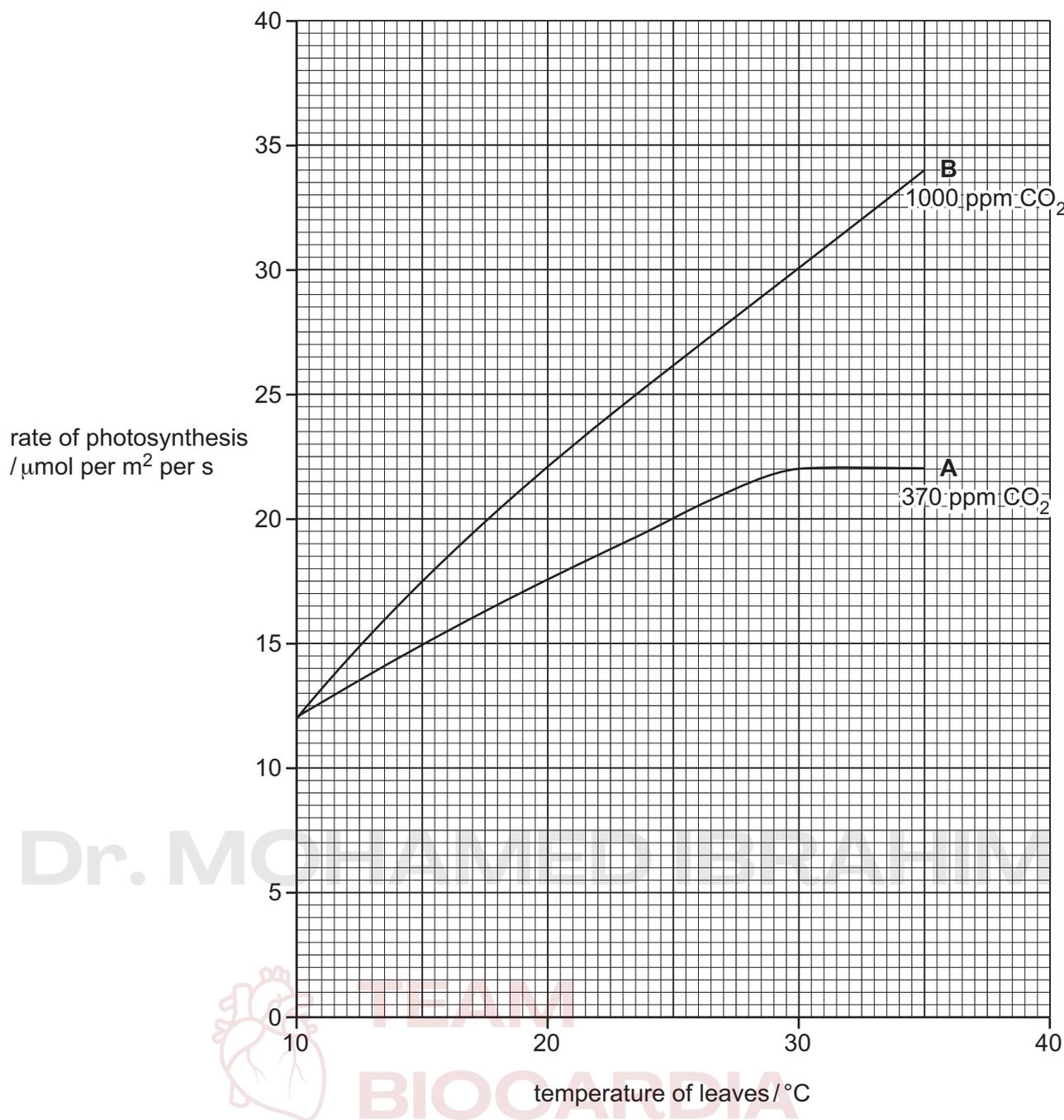


Fig. 2.2

- (i) State **one** environmental factor that should have been kept constant in this investigation.

..... [1]

Plant Nutrition

- (ii) Describe the effect of temperature on the rate of photosynthesis when carbon dioxide concentration **A** was supplied.

Use the data from Fig. 2.2 in your answer.

.....

.....

.....

.....

.....

.....

.....

..... [3]

- (iii) Calculate the percentage increase in the rate of photosynthesis at 30 °C when the carbon dioxide concentration was increased from **A** to **B** as shown in Fig. 2.2.

Show your working and give your answer to the nearest whole number.

..... %

[2]

- (iv) Explain the effect of increasing temperature on the rate of photosynthesis for carbon dioxide concentration **B**.

Use the term *limiting factor* in your answer.

.....

.....

.....

.....

.....

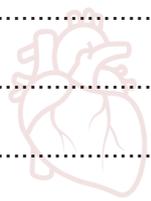
.....

.....

.....

..... [3]

Dr. MOHAMED IBRAHIM



TEAM
BIOCARDIA

Plant Nutrition

- (v) The student concluded that carbon dioxide concentration is the factor limiting the rate of photosynthesis between 30 °C and 35 °C for the results shown for **A** in Fig. 2.2.

State the evidence for this conclusion.

.....

.....

..... [1]

Dr. MOHAMED IBRAHIM

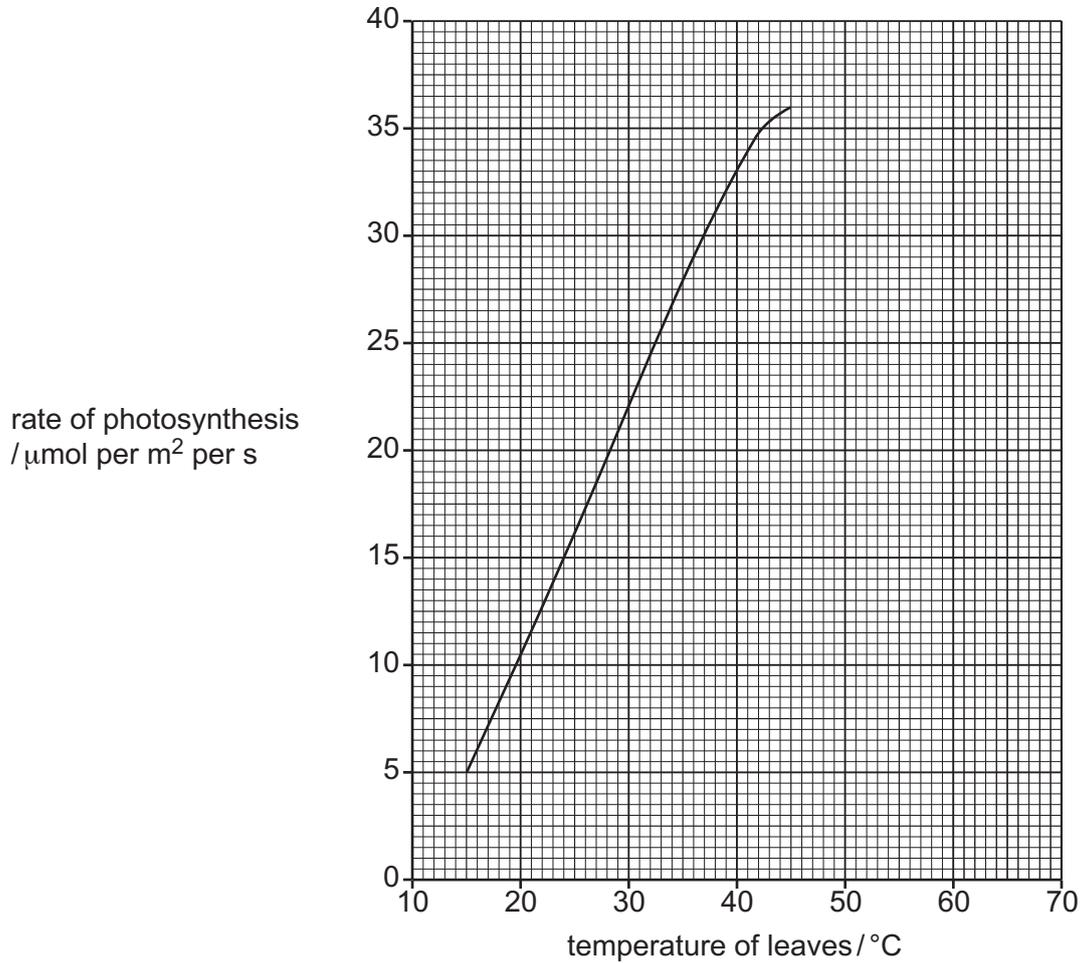


TEAM
BIOCARDIA

Plant Nutrition

- (d) A similar investigation was carried out on Arizona honeysweet, *Tidestromia oblongifolia*, that grows in Death Valley in California where the highest temperatures may be greater than 45°C.

The results are shown in Fig. 2.3.



Dr. MOHAMED IBRAHIM **Fig. 2.3**

Predict **and** explain what would happen to the rate of photosynthesis if the investigation is continued at temperatures higher than 45°C.

.....

.....

.....

.....

..... [2]

[Total: 16]

Plant Nutrition

14

(c) Water is one of the raw materials needed for the production of sugars in photosynthesis.

(i) State the name of the other raw material needed for photosynthesis.

..... [1]

(ii) State **three** ways a plant uses the sugars produced in photosynthesis.

1

2

3

[3]

0610/42/F/M/19

[Total: 14]

(b) The food available to animals in the Arctic tundra is limited. There is a short growing season for plants and the environmental conditions do not favour high rates of photosynthesis and growth compared with temperate and tropical ecosystems.

State **three** conditions that limit plant growth rates.

1

2

3

[3]

0610/43/M/J/18

Dr. MOHAMED IBRAHIM



TEAM BIOCARDIA

Plant Nutrition

- 3 Fig. 3.1 is a scanning electron micrograph of a vertical section through part of the leaf of a broad bean plant, *Vicia faba*.



Fig. 3.1

- (a) (i) State the names of the tissues labelled **A** and **B**.

A

B

[2]

- (ii) The cells in regions **B** and **C** in Fig. 3.1 have a large surface area.

Explain why this is necessary for the functioning of the leaf cells.

Dr. MOHAMED IBRAHIM



TEAM

BIOCARDIA

[3]

- (iii) Explain why there are many interconnecting air spaces within the leaf.

.....
.....
.....
.....
.....[2]