**Plant Data Analysis and Essay Questions**

**1.** Seed dispersal is important in the migration of plants from one area to another area. Plants have evolved many methods, both physical and biological, by which to disperse their seeds.

 50 maple seeds, which are wind dispersed, were dropped one at a time from two different heights, 0.54 m and 10.8 m respectively. The histograms below show the distribution of the distance the maple seeds travelled.



[Source: student experiment, Guralnick]

(a) For each height, identify the distance travelled by the greatest number of seeds.

(i) Height = 0.54 m: .........................................................................................................

(ii) Height = 10.8 m: ..................................................................................... (1)

(b) State the effect of height on seed dispersal. (1)

(c) Suggest **two** reasons for the effect of the drop height on the distance travelled by the seeds. (2)

The following graphs show the rate and timing of seed release from different species of grass in the same area during the summer.



[Source: J L Harper, *Population Biology of Plants,* Academic Press (Harcourt Brace Jovanovich) 1997, page 57]

(d) Identify the grass species which produces the most seeds in this area..(1)

(e) Identify the grass species which produces the most seeds in June.(1)

(f) Compare seed production for all species relative to the timing of their release. (3)

(g) Suggest **two** benefits for these plants in the timing of seed release.(2)

Biological seed dispersal is usually dependent on the nutritional content of the seed or fruit. The following table gives the nutritional content for fruits of different species in temperate and tropical climates.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Percentage by Dry | Weight |  |
| Common Name *(genus)* | Protein Lipid | Carbohydrate | Dispersal Agents |
|  |  | **Temperate** |  |  |
| Cranberry *(Vaccinium)* | 3 | 6 | 89 | Birds |
| Hawthorn *(Crataegus)* | 2 | 2 | 73 | Birds |
| Pin cherry *(Prunus)* | 8 | 3 | 84 | Birds |
| Pokeberry *(Phytolacca)* | 14 | 2 | 68 | Birds |
| Strawberry *(Fragaria)* | 6 | 4 | 88 | Birds |
|  |  | **Tropical** |  |  |
| Bird palm *(Chamaedorea)* | 14 | 16 | 55 | Birds |
| Fig *(Ficus)* | 7 | 4 | 79 | Bats |
| Mistletoe *(Viscum)* | 6 | 53 | 38 | Birds |
| Monkey fruit *(Tetragastris)* | 1 | 4 | 94 | Monkeys |
| Wild nutmeg *(Virola)* | 2 | 63 | 9 | Birds |

[Source: H Howe and L Westley, *Ecological Relationship of Plants and Animals,*
 Oxford University Press 1988, page 121]

(h) Compare tropical fruits to temperate fruits in relation to the mean values for lipid, carbohydrate and protein content.(2)

(i) Explain which fruit would have the highest energy content.(2)

(j) Suggest **one** advantage and **one** disadvantage of dispersal of seeds by animals. (2)

(Total 17 marks)

**2.** Draw a labelled diagram to show the external parts of a **named** dicotyledonous plant. **(Total 5 marks)**

**3.** The leaves of plants are adapted to absorb light and use it in photosynthesis. Draw a labelled diagram to show the arrangement of tissues in a leaf.

(Total 6 marks)

**4.** Outline the role of the phloem in the active translocation of biochemicals.

(Total 5 marks)

**5.** Explain how the abiotic factors of light, wind and humidity affect the rate of transpiration.

(Total 8 marks)

**6.** Explain the process of water uptake and transport by a plant.

(Total 8 marks)

**7.** Describe the metabolic events of germination in a typical starchy seed.

(Total 5 marks)

**8.** Draw the structure of a dicotyledenous animal-pollinated flower.

(Total 6 marks)

**9.** Explain how manipulation of day length is used in the production of flowers.

(Total 6 marks)

**10.** Describe how flowering is controlled in long day plants (LDP)

(Total 4 marks)