**B8 - REPRODUCTION**

**8.2 - Sexual reproduction in plants**

**1. Identify and draw, using a hand lens if necessary, the sepals, petals, stamens, anthers, carpels, ovaries and stigmas of one locally available, named insect-pollinated, dicotyledonous flower, and examine the pollen grains under a light microscope or photomicrographs.**

Insect pollinated, dicot. flower.

And the pollen grains.



**2. Use a hand lens to identify and describe the anthers and stigmas of one locally available, named, wind-pollinated flower.**



Figure showing wind-pollinated flower

A-Bract,

B-Feathery stigma,

C-Anther loosely attached to the filament, D- Ovary

**3. State the functions of the sepals, petals, anthers, stigmas and ovaries.**

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| *Part* | *Function* |
| Petal | Often large and coloured, to attract insects |
| Sepal | Protects the flower while in bud |
| Petiole (stalk) | Supports the flower to make it easily seen by insects, and to be able to withstand wind |
| Stamen | The male reproductive part of the flower, made of anther and filament |
| Anther | Contains pollen sacs, in which pollen grains are formed. Pollen contains male sex cells |
| Filament | Supports the anther |
| Carpel | The female reproductive part of the flower, made of stigma, style and ovary |
| Stigma | A sticky surface that receives pollen during pollination |
| Style | Links the stigma to the ovary, through which pollen tubes grow |
| Ovary | Contains ovules, which develop into seeds when fertilised |

**4. Candidates should expect to apply their understanding of the flowers they have studied to unfamiliar flowers.**

**5. Define pollination.**

Transfer of pollen grains from the male part of the plant (anther) to the female part (stigma).

**6. Name the agents of pollination.**

 *Wind; Animals including insects; Water*

**7. Compare the different structural adaptations of insect-pollinated and wind-pollinated flowers.**

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| Feature | Insect-pollinated | Wind-pollinated |
| Petals | Present- often large, coloured and scented | Absent or small and inconspicuous |
| Nectar | Produced by nectaries to attract insects | Absent, or small and green |
| Stamen | Present inside the flower | Long filaments, allowing the anthers to hang freely outside the flower so the pollen is exposed to the wind |
| Stigmas | Small surface area, inside the flower | Large and feathery, hanging outside the flower to catch pollen |
| Pollen | Smaller amounts- grains are often round and sticky, or covered in spikes to attach to the furry bodies of insects | Larger amounts of smooth and light pollen grains, which are easily carried by the wind |
| Bracts (modified leaves) | Absent | Sometimes present |

**8. Investigate and state the environmental conditions that affect germination of seeds: requirement for water and oxygen, suitable temperature.**

*IGCSE Biology* (Jones & Jones), p.190, activity 13.4 – ‘to find the conditions necessary for the germination of tomato seeds’.

*Environmental conditions affecting germination*

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| *Environmental condition* | *Explanation* |
| Water | Absorbed through micropyle, needed to activate enzymes which convert insoluble food stores into soluble foods needed for growth and energy production. |
| Oxygen | Needed for respiration, to release energy for growth and chemical changes for mobilization of food reserves |
| Suitable temperature | For enzymes to work as enzymes work best at optimum temperature |
| Light | Not usually a requirement for germination but some seeds need a period of exposure to light before they germinate |

**9. Investigate and describe the structure of a non-endospermic seed in terms of the embryo (radicle, plumule & cotyledons) and testa, protected by the fruit.**



* After fertilization, the ovule becomes a zygote;
* The zygote divides by mitosis to form an embryo plant;
* The ovule is now called a seed;
* The ovary becomes the fruit.

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| *Part of the seed* | *Structure* | *Function* |
| Testa | Tough protective covering | Stop embryo from being damaged, prevents bacteria and fungi from entering the seed |
| Cotyledons | Food store | Contains starch, protein and enzymes |
| Radicle | Part of embryo | Grow into root |
| Plumule | Part of embryo | Grow into shoot |
| Micropyle | Tiny hole in testa | Water and oxygen enters the seed through this hole |
| Hilum | A scar near the micropyle | Where the seed was joined to the pod (ovary) |

**10. State that seed and fruit dispersed by wind and by animals provides a means of colonizing new areas.**

* Dispersal of seeds is important, because it prevents too many plants growing close together;
* If this happens, they compete for light, water and nutrients, so that none can grow properly;
* Dispersal also allows the plant to colonise new areas.

**11. Describe, using named examples, seed and fruit dispersed by wind and by animals.**

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| *Wind dispersed fruit* |
| Dandelion* Dandelion fruit has a group of fine hairs called a pappus;
* Pappus acts as a parachute and catches wind;
* The fruit counterbalances the pappus.
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| Sycamore* Sycamore has a wing with a large surface area;
* When fruit drops of the tree it spins, slowly down its descent;
* If caught by wind the seed will be carried away from the parent plant, reducing competition for nutrients, water and light.
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| *Animal dispersed fruit* |
| Succulent fruits e.g. blackberry* They are coloured, juicy and nutritious and hence attracted by animals;
* When eaten seeds pass through the gut without getting digested and deposited with animal faeces far away from the parent plant.
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| Hooked fruits e.g. bur* Catch on to animal’s fur as it brushes past the parent plant;
* Eventually the seed drop off and gets dispersed far away from the parent plant.
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