**Courses for**

**Royal Horticultural Society**

**Qualifications**

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| **Workbook for****The RHS Level 2 Certificate in****Principles of Plant Growth and Development** |

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| **Unit 2 Topic 1** |

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| **Background pattern  Description automatically generated with medium confidence** | **B.E.S.T. in Horticulture Education Limited** ***“Delivering the best in horticultural education and learning”***[**www.bestinhorticulture.co.uk**](http://www.bestinhorticulture.co.uk) |

The revision workbook takes you through topic 1 of unit 2, the aim is to help you consolidate the course material into a set of revision notes to prepare for the RHS examinations.

You may prefer to fill it in as you go through each element, or to work through it at the end of the topic.

It is not compulsory to complete this – you may have a totally different way of revising effectively.

 **Topic 1: Plant Science II**

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| **Element 1: Leaf adaptations** |
| **AO1: Knowledge** | **AO2: Application** |
| Leaf adaptations to include:* Hairy
* Waxy
* Coloured
* Rolled
* Variegated
* Reduced
* Succulent
* Oils
* Aerenchyma cells
* Bulbs

The potential of leaves for propagation (totipotency). | Advantages of leaf adaptations for the plant to include:* Reduced transpiration
* Increased humidity
* Reflection of light
* Cooling of leaf
* Storage of water
* Protection from herbivory
* Buoyancy in aquatics.
 |

**State the primary purpose of leaves:**

**Describe the process that helps to keep the leaf cool in heat:**

**Describe the leaf adaptation to reflect sunlight and list 3 plants that have adapted to do this:**

**Describe three further leaf adaptations naming one plant example for each adaptation.:**

1.

2.

3.

**Explain totipotency and why it is important to horticulturalists:**

**Topic 1: Plant Science II**

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| **Element 2: Stem adaptations** |
| **AO1: Knowledge** | **AO2: Application** |
| Stem adaptations to include: * Secondary thickening/wood
* Physical defence, including thorns, prickles, spines
* Tendrils
* Twining stems
* Stolons
* Tubers
* Runners
* Glandular hairs or ducts containing essential oils
* Corms
* Rhizomes
* The potential of stems for totipotency
 | Advantages to stem adaptations, to include: * Defence from herbivory
* Support
* Enhanced light
* Water storage
* Carbohydrate storage
* Resilience to weather conditions
 |

**List five purposes of the plant stem:**

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**Describe secondary thickening:**

**Complete the following table of stem adaptations:**

|  |  |  |
| --- | --- | --- |
| **Adaptation** | **Description** | **Plant examples** |
| Defences: |  |  |
| Tendrils & twining stems: |  |  |
| Stolons: |  |  |
| Tubers: |  |  |
| Runners: |  |  |
| Glandular hairs/ducts: |  |  |
| Cold resilience: |  |  |

**List five ways that stems can be used for propagation giving one plant example for each method:**

1.

2.

3.

4.

5.

**Topic 1: Plant Science II**

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| **Element 3: Root adaptations** |
| **AO1: Knowledge** | **AO2: Application** |
| Root adaptations to include:* Fibrous
* Tap
* Foraging
* Tropisms
* Adventitious buds
* Tubers
* Pneumatophores
* Root nodules in legumes
* Adventitious roots/prop roots
* The potential of roots for propagation (totipotency)
 | Advantages of roots adaptations for the plant to include:* Anchorage/support
* Water/nutrient uptake
* Orientation
* Search for nutrition and water
* Reproduction
* Carbohydrate storage
* Water storage
* Gaseous exchange
 |

**State the primary function of the roots:**

**Complete the following table of root adaptations:**

|  |  |  |
| --- | --- | --- |
| **Adaptation** | **Description** | **Plant examples** |
| Fibrous |  |  |
| Tap |  |  |
| Foraging |  |  |
| Tropisms |  |  |
| Adventitious buds |  |  |
| Tubers |  |  |
| Pneumatophores |  |  |
| Root nodules in legumes |  |  |
| Adventitious root/prop roots |  |  |

**Describe the symbiotic relationship between plants and fungi:**

**Explain how roots can be used for propagation:**

**Topic 1: Plant Science II**

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| **Element 4: Flower adaptations** |
| **AO1: Knowledge** | **AO2: Application** |
| Flower adaptations, to include:* Flower arrangements
* Timing of flowering
* Petals (bright/reduced)
* Scent
* Nectar
* Hermaphrodite
* Monoecious
* Dioecious
* Quantity and characteristics of pollen
 | Advantages and functions of flower adaptations for the plant, to include:* Enhancing pollination
* Linking pollination characteristics to vectors of pollination
* Favouring cross pollination
 |

**Complete the following table of flower adaptations:**

|  |  |  |
| --- | --- | --- |
| **Flower arrangement** | **Description** | **Plant example** |
| Raceme |  |  |
| Corymb |  |  |
| Simple umbel |  |  |
| Panicle |  |  |
| Cyme |  |  |
| Capitulum |  |  |
| Verticillaster |  |  |

**State the reason for flowering time adaptations in flowers:**

**Explain dichogamy:**

**Explain protandry:**

**Explain protogyny:**

Explain three different ways flowers attract pollinators, using a named plant example for each:

1.

2.

3.

**State the meaning of the following:**

|  |  |
| --- | --- |
| Hermaphrodite |  |
| Imperfect |  |
| Perfect |  |
| Monoecious |  |
| Dioecious |  |

**Define cross pollination:**

-

**Define self-pollination:**

-

**Explain how the flower can adapt to encourage cross-pollination:**

**Complete the following table comparing the differences between insect and wind pollinated plants:**

|  |  |
| --- | --- |
| **Insect pollinated plants** | **Wind pollinated plants** |
|  |  |
|  |  |
|  |  |
|  |  |
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**Topic 1: Plant Science II**

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| **Element 5: Seed Adaptations** |
| **AO1: Knowledge** | **AO2: Application** |
| Seed adaptations, to include:* Quantity of seed produced
* Dispersal mechanism
* Dormancy mechanisms
* Seed coats
* Storage of fats and oils
* Orthodox
* Recalcitrant
 | Advantages of seed adaptations for plant dispersal (geographic and in time)The benefits of seed adaptations for germination, to include:* Light
* Moisture
* Temperature

Techniques to overcome dormancy in horticultural situations, to include:* Washing
* Scarification
* Stratification
 |

**State the purpose of seeds:**

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**Explain why some plants produce large seeds and some produce tiny seeds:**

**Describe the different dispersal mechanisms, using a named plant example for each:**

|  |  |  |
| --- | --- | --- |
| **Dispersal mechanism** | **Description** | **Plant example** |
| Released into the wind |  |  |
| Explosive mechanism |  |  |
| Twist & split |  |  |
| Transported by animals |  |  |
| Float away on water |  |  |
| Eaten by birds/mammals |  |  |

**List what a viable seed needs to be able to germinate:**

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**Describe dormancy:**

**List four ways that dormancy is imposed on seeds:**

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**Describe three ways of overcoming dormancy?**

1.

2.

3.

**Explain how to store both orthodox and recalcitrant seeds:**

1. Orthodox:

2. Recalcitrant:

**Topic 1: Plant Science II**

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| **Element 6: Growth habit adaptations** |
| **AO1: Knowledge** | **AO2: Application** |
| Growth habit adaptations, including:* Low to ground (alpines)
* Perennial
* Woody
* Evergreen
* Deciduous
 | Advantage of growth habit adaptations to the plant, including:* Optimising microclimates
* Surviving adverse winter conditions
* Ecological services
 |

**Complete the following table, describing the different growth habits and forms, giving a named example for each:**

|  |  |  |
| --- | --- | --- |
| **Growth habits and forms** | **Description** | **Plant example** |
| Ground-hugging forms |  |  |
| Dwarf or sub-shrubs |  |  |
| Ground cover and layering |  |  |
| Herbaceous perennials |  |  |
| Seasonal ephemerals |  |  |
| Evergreen perennials |  |  |
| Tender perennials |  |  |
| Deciduous trees |  |  |
| Evergreen trees |  |  |
| Shrubs |  |  |
| Climbers |  |  |