



Sharing the best in Gardening

RHS Qualifications

RHS Level 2 Certificate in the Principles of Plant Growth, Propagation and Development

Qualification Specification

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1. RHS Qualifications Contact Details

RHS Qualifications is the Awarding Organisation of the Royal Horticultural Society.

RHS Qualifications
RHS Garden Wisley
Woking
Surrey
GU23 6QB
UK

Tel: 01483 226500

Email: qualifications@rhs.org.uk

Approved Centre Web Portal: www.rhsq.org.uk

2. Equality and Diversity Policy Statement

RHS Qualifications is committed to policies that will promote equal opportunities in all its operations, regardless of age, disability, ethnic origin, gender, marital status, religion, sexual orientation or any other factor.

RHS Qualifications is committed to ensuring that there is no unfair discrimination in any of its operations and will take into account all current legislation in relation to the equality of opportunity.

RHS Qualifications will constantly monitor and review its policies and practices pertaining to equal opportunities, to ensure that they remain consistent with its equal opportunities objectives and continue to comply with all relevant legislation.

RHS Qualifications will strive to make awareness of and respect for equality and diversity, an integral part of the culture of the organisation.

A copy of the RHS Qualifications Equality and Diversity Policy is available on the Approved Centre Web Portal.

3. RHS Level 2 Certificate in the Principles of Plant Growth, Propagation and Development

3.1 Introduction

This qualification provides a route to employment in professional horticulture by assessing knowledge of the scientific principles underpinning horticultural practices, and supports career development for those already working in the profession. It also provides a foundation for further learning or training in the field of horticulture.

There are no pre-requisites for entry to the qualification

The qualification is accredited within the Qualifications and Credit Framework.

Accreditation Number: 500/8296/6

3.2 Credit Value

The qualification has a credit value of 14.

This equates to 140 learning hours. Learning time is defined as the time taken by learners at the level of the qualification, on average, to complete the learning outcomes of the units to the standard determined by the assessment criteria.

3.3 Teaching Pattern

The qualification is designed to be studied on a part-time basis. No particular teaching pattern is specified, and centres offering courses leading to the qualification are free to define their own teaching structure and teaching hours.

3.4 Qualification Structure

The qualification will be awarded to those who gain the credits for the following four mandatory units:

RHS Ref	Unit	Credits	Level
R2101	Plant classification, structure, and function Unit reference number H/601/0307	5	2
R2102	Plant nutrition and the root environment Unit reference number A/601/0314	3	2
R2103	Maintaining plant health Unit reference number K/601/0342	3	2
R2104	Understanding plant propagation Unit reference number M/601/0343	3	2

3.5 Assessment

Each unit will be assessed by a separate written examination covering all learning outcomes specified in the unit.

Examinations must be taken in a centre approved by RHS Qualifications, or under arrangements for exceptional supervision agreed by RHS Qualifications.

Examinations must be conducted in accordance with the RHS Regulations for the Conduct of Examinations.

Examinations will be offered twice a year in February and June.

3.6 Language

Examinations will be offered in English.

3.7 Grading

Credits for a unit will be awarded to a candidate who achieves a mark of 50% or more in the written examination for that unit.

Where a candidate achieves a mark of 70% or more in the examination for the unit, the credits for the unit will be awarded with commendation.

RHS Ref	Unit	Mark	Pass with Commendation	Pass
R2101	Plant classification, structure, and function	100	70	50
R2102	Plant nutrition and the root environment	60	42	30
R2103	Maintaining plant health	60	42	30
R2104	Understanding plant propagation	60	42	30

Where a candidate receives credits with commendation in all four mandatory units, the qualification will be awarded with commendation.

4. Approved Centres

Centres wishing to offer examinations leading to RHS qualifications must be approved by RHS Qualifications.

Applications for approval should be sent to the Quality Assurance and Relationships Officer at the contact details in section 1.

5. Candidate Registration

Candidates should be registered for examinations in the units of the qualification through the RHS Qualifications Web Portal.

Approved Centres undertake to obtain on behalf of their learners a Unique Learner Number (ULN) and a learner record, unless the learner chooses not to have one.

If centres supply an email address for candidates at the time of registration, candidates will be invited to open an account on the RHS Qualifications Web Portal, and will be able to view their examination history, their current registrations, and their results when available.

6 Reasonable Adjustments and Special Consideration

RHS Qualifications is committed to ensuring fair assessment for all candidates, and will facilitate access to its qualifications through reasonable adjustments to assessment arrangements for candidates with an identified specific need. An example of a reasonable adjustment which could be made is the production of a modified examination paper for a candidate with a visual impairment.

Special consideration is given following the examination to candidates who are present for the examination but may have been disadvantaged by temporary illness, injury or adverse circumstances which arose at, or near, the time of examination.

Full guidance is provided in the document 'Guidance to Centres for Reasonable Adjustments and Special Consideration'. The document is available on the RHS website (www.rhs.org.uk), the RHS Qualifications Approved Centre Web Portal, or can be obtained from RHS Qualifications.

Applications for reasonable adjustments or special consideration must be made by the Approved Centre on behalf of the candidate. Application must be made within specified timescales.

7. Enquiry about Results service

The following service is available to candidates who have a query regarding their examination result:

Re-mark and Feedback

Re-marking of the examination paper by an independent examiner.
Feedback will be provided identifying areas of strength and weakness with constructive suggestions for improvement.

Candidates requesting a re-mark need to be aware that grades may go down as a result of the re-marking.

Applications for the 'Enquiry about Results Service' must be made through the Approved Centre where the candidate registered for the examination. This service will be available for 28 days from the date of release of the results to Approved Centres on the RHS webportal.

8. Examination Dates

For a full list of examination dates please see the Qualifications and Credit Framework Examination Dates, this document is available on the Qualifications page on the RHS website and on the RHS Webportal.

9. Fees

For a full list of fees please see the Qualifications and Credit Framework Fees Notice, this document is available on the Qualifications page on the RHS website and on the RHS Webportal.

All fees are payable prior to confirmation of service or entry for the examination.

Late Entries

RHS Qualifications publishes annually, and distributes to Approved Centres, the closing dates of entry for each examination for the following year.

Entries submitted after the published closing date will be subject to a late entry fee. The total fee charged for late entries is twice the standard examination fee for each unit

Replacement Certificate (if lost, damaged or destroyed)

The fee for a replacement certificate can be found on the Qualifications and Credit Framework Fees Notice. Please send your request to the Qualifications Department.

Re-mark & Feedback

The fee for a remark and feedback can be found on the Qualifications and Credit Framework Fees Notice.

If a re-mark results in an upgrade of the result, the fee paid will be refunded

10. Exemptions

The 'Regulatory arrangements for the Qualifications and Credit Framework' allow exemptions to be granted for units based upon certificated achievement in other qualifications. RHS Qualifications will grant exemption from specified units in RHS QCF qualifications where a candidate has passed certain components of RHS qualifications in the National Qualifications Framework (current RHS qualifications).

- All requests for exemption will be reviewed on a case by case basis. Applications must be made to RHS Qualifications and an administration fee will be charged
- Candidates will need to have obtained 50% of the available marks for the NQF component (within the Paper/Module) in order to obtain exemption from the QCF unit
- All exemptions are treated as equivalent to a pass. No certificate or credit is awarded for units for which exception has been granted.

Applications for exemptions must be made through the Approved Centre where the candidate is registered. The fee for applying for exemptions can be found on the Qualifications and Credit Framework Fees Notice.

RHS Qualification	Component	Exemption given for:
Level 2 Horticulture I	The Plant (Plant Kingdom)	Plant classification, structure and function
Level 2 Horticulture I	Plant Propagation (Flora)	Understanding plant propagation
Level 2 Horticulture II	The Root Environment and Plant Nutrition (Flora)	Plant nutrition and the root environment
Level 2 Horticulture II	Horticultural Plant Health Problems	Maintaining Plant Health

11. Appeals Procedure

An Appeals procedure exists to conduct appeals lodged by candidates against decisions made by RHS Qualifications, concerning their examination performance, the granting of an award and/or the closure of their entry to an award on academic grounds.

The procedure is also followed in cases where there is irregularity or malpractice in the conduct of examinations and where RHS Qualifications has imposed a penalty on a candidate, tutor or invigilator, and the Centre wishes to appeal against this decision after results are published.

A copy of the procedure is available on the RHS Qualifications Web Portal and on the RHS website.

12. Policy on Malpractice and Maladministration

Malpractice consists of those acts which undermine the integrity and validity of the assessment or examination, the certification of qualifications and/or damage the authority of those responsible for conducting the assessment, examination and certification.

RHS Qualifications does not tolerate actions or attempted actions of malpractice by learners or centres in connection with RHS qualifications. RHS Qualifications may impose penalties and/or sanctions on candidates or centres where incidents, or attempted incidents, of malpractice have been proven.

A copy of the full policy is available on the RHS Qualifications Web Portal and on the RHS website.

Plant classification, structure and function

RHS reference number: R2101

Unit reference number: H/601/0307

Unit guided learning: 38

Level: Level 2

Credit Value: 5

Unit purpose and aim(s): This unit will enable candidates to develop an understanding of the basis on which higher plants are classified and named, and to appreciate the role and function of morphological and anatomical features in higher plants. The unit will ensure that the fundamental physiological processes within the plant are understood including photosynthesis, respiration and water movement. Additionally students will understand the mechanisms of pollination, fertilisation, seed formation and subsequent germination.

Learning Outcomes

The learner will:

1. Know the basic classification and taxonomy of plants.

2. Know the stages of plant development and life cycles

Assessment Criteria

The learner can:

- 1.1 Identify the basic differences between gymnosperms and angiosperms
- 1.2 Describe differences between the monocotyledon and dicotyledon divisions of the angiosperms, including the external features of root type, leaf shape and venation, and internal differences in the distribution of vascular bundles, lignification, and secondary growth.
- 1.3 State the reasons why a universal system of plant names is important.
- 1.4 Describe the use of the terms 'genus', 'species, and 'cultivar'.
- 2.1 Describe the five stages of the life cycle of plants: seed, juvenile, adult, senescent, death.
- 2.2 Define the terms: 'annual', 'ephemeral', 'biennial' and 'perennial'.
- 2.3 Define the terms: 'tender', 'half-hardy' and 'hardy' as applied to annuals.
- 2.4 Define the terms: 'tender', 'half-hardy', 'hardy', 'herbaceous' and 'woody' in relation to perennials, including the process of lignification.
- 2.5 State the meaning of the terms 'evergreen', 'semi-evergreen' and 'deciduous'.

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| 3 | Know the structure and function of plant cells and tissues | <p>3.1 Describe the structure of the basic plant cell and state the function of the basic components, including the cell wall, cell membrane, nucleus, vacuole, cytoplasm, chloroplasts & mitochondria.</p> <p>3.2 State where active cell division is located within the plant (apical and lateral meristems).</p> <p>3.3 Define the term: 'plant tissue'.</p> <p>3.4 Describe the basic characteristics and role of the tissues found in flowering plants, identifying protective, meristematic, transport, packing, strengthening, and support functions.</p> |
| 4 | Know the function of the external vegetative parts of the plant. | <p>4.1 Define: 'primary', 'secondary', 'tap', 'lateral', 'fibrous', and 'adventitious' roots.</p> <p>4.2 Describe the external structure of the root tip and the role of the root cap and root hairs.</p> <p>4.3 Describe how the root is adapted in order to perform specific functions, including storage (e.g. tap root, tuber); and climbing.</p> <p>4.4 Describe the external structure of the stem.</p> <p>4.5 Describe how the stem is adapted in order to perform specific functions, including protection; storage (e.g. corms, tubers, rhizomes); climbing; natural vegetative reproduction (e.g. stolons, rhizomes, tubers, runners).</p> <p>4.6 Describe the external structure of the leaf, including the petiole, lamina, and midrib; its shape and colour, and arrangement on the stem.</p> <p>4.7 Describe how leaves are adapted to perform other functions including storage (eg bulbs); protection; climbing; and attraction of pollinators.</p> <p>4.8 Describe transverse sections of the young dicotyledon root, stem, and leaf; these should include the location of the following: epidermis, cortex, xylem, phloem, pith, cambium, vascular bundles, endodermis, pericycle, palisade & spongy mesophyll, cuticle, stomata.</p> |

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| 5. | Know the function of the reproductive parts of the plant | <p>5.1 Describe the structure of a typical dicotyledon flower, including sepals, petals, tepals, calyx, corolla, nectaries, anther, filament, stigma, style, ovary and ovule.</p> <p>5.2 State the role of each component of the flower listed in 5.1</p> <p>5.3 State the meaning of the terms: 'monoecious', 'dioecious' and 'hermaphrodite'.</p> <p>5.4 Describe the process of pollination, including self-pollination and cross-pollination.</p> <p>5.5 Compare the characteristics of wind and animal pollinated plants, including the exposure of reproductive structures, pollen surface roughness, and quantity of pollen produced.</p> <p>5.6 Describe the process of fertilisation, including the meaning of the terms 'gametes', 'zygote', 'incompatible', and 'compatible'.</p> |
| 6. | Know the function of fruits and seeds. | <p>6.1 Define the term 'fruit' and state the role of the fruit in plant reproduction.</p> <p>6.2 State that fruits can be divided into dry types (dehiscent and indehiscent) and fleshy (succulent) types (true and false); and that these can be distributed by wind, water, animals (externally), and animals (internally).</p> <p>6.3 Name one example of each type of fruit listed in 6.2, and one example for each distribution method.</p> <p>6.4 Describe the internal and external structure of the seed of a monocotyledon (examples to include maize, <i>Zea mays</i>) and a dicotyledon (examples to include French bean, <i>Phaseolus vulgaris</i> and broad bean, <i>Vicia faba</i>).</p> <p>6.5 Describe the behaviour of French bean (<i>Phaseolus vulgaris</i>), and broad bean (<i>Vicia faba</i>) as examples of epigeal and hypogeal germination.</p> |

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| 7. Understand the importance of photosynthesis and respiration. | 7.1 State the basic equation for photosynthesis in words. |
| | 7.2 Describe how levels of temperature, light, carbon dioxide water and mineral nutrients determine the efficiency of photosynthesis. |
| | 7.3 State the basic equations for aerobic and anaerobic respiration in words. |
| | 7.4 Describe how levels of oxygen and temperature determine the efficiency of respiration. |
| 8. Understand the movement of water and minerals through the plant. | 8.1 Define the term: 'transpiration', and describe how water and minerals move through the plant. |
| | 8.2 Describe diffusion and osmosis and their roles within the plant, including gaseous and liquid diffusion, transpiration, and water uptake. |
| | 8.3 Describe how the plant may limit water loss, including the action of stomata and specific leaf adaptations (hairs, thick cuticle, needles). |
| | 8.4 Describe the effects of relative humidity and temperature on transpiration. |
| 9. Understand plant growth and development relationships | 9.1 Describe the stages of growth and development during the life cycle of a plant. |
| | 9.2 Describe how simple cell division and enlargement produces growth and results in an increase in size of plants |
| | 9.3 Describe how competition for water, nutrients, light and space influences the growth of plants. |
| | 9.4 Describe the role of auxin in plant development (influencing shoot and roots), and in phototropic responses. |

Plant nutrition and the root environment

RHS reference number: R2102

Unit reference number: A/601/0314

Unit guided learning hours: 23

Unit Level: Level 2

Credit Value: 3

Unit purpose and aim(s): This unit will enable candidates to develop an understanding of the constituents, properties and management of soils and growing media.

Learning Outcomes

The learner will:

1. Understand the importance of using safe, healthy and environmentally sustainable practices.
2. Know the main horizons found in soil profiles.
3. Know the physical properties of soil.

Assessment Criteria

The learner can:

- 1.1 Describe how horticultural practices can affect the environment, including examples of: soil cultivations; irrigation and drainage; soil improvement; composting; choice of growing media.
- 1.2 Explain how the practices listed in 1.1 can be adapted to reduce the impact on the environment.
- 2.1 Name the main horizons found in a typical soil profile, including the organic horizon, topsoil, subsoil, and parent material (rock).
- 2.2 Describe the typical characteristics of each horizon, in terms of: the presence of organic matter; soil organisms; pore space; products of leaching and deposition such as nutrients (iron), clay and stones.
- 2.3 Describe the properties of top soil that contribute to the healthy growth of plants, in terms of: the presence of organic matter; soil organisms; soil structure; air content; water content; nutrient content.
- 2.4 State the purposes of primary and secondary soil cultivations, including the addition of soil conditioners.
- 3.1 Explain what is meant by 'soil texture'.
- 3.2 Describe the physical characteristics of the soil particles sand, silt and clay.

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| | 3.3 | Describe how the characteristics of each of the soil particles listed in 3.2 affect soils and their suitability for horticultural use. |
| | 3.4 | Explain what is meant by 'soil structure' (soil aggregates) and state how root establishment and growth are affected by different soil structures. |
| | 3.5 | State that a crumb soil is the ideal structure for horticultural use. |
| | 3.6 | Describe two methods by which soil structure can be improved and two practices which damage soil structure, to include: incorporation of organic matter; addition of inorganic soil improvers; compaction; and cultivation techniques. |
| | 3.7 | State what is meant by 'surface capping'; explain how it may happen and what effects it can have on plant establishment and growth. |
| | 3.8 | Describe how a cultivation pan can be formed, what effect it has on plant growth, and how it can be rectified. |
| 4. | | Understand the factors that determine the water status in the soil. |
| | 4.1 | Describe the relationship between air and water content in the pore space of soils and growing media. |
| | 4.2 | Explain the importance of an appropriate balance between air and water for the healthy growth of plants. |
| | 4.3 | Identify the surface symptoms of poor drainage, to include: standing water, surface run-off and indicator plant species. |
| 5. | | Understand the importance of organic matter and living soil organisms in the root environment. |
| | 5.1 | State the main sources of organic matter in the soil, to include: recycling of natural resources (plant and animal remains); incorporation of imported resources, e.g. farm-yard manure and garden compost; incorporation of crop debris. |
| | 5.2 | Describe TWO beneficial effects and TWO limitations of organic matter in the soil. |
| | 5.3 | List four bulky organic materials that can be used for soil improvement in a garden, including farmyard manures; garden compost; mushroom compost; composted municipal waste. |

- 5.4 Compare the benefits and limitations of each of the materials listed in 5.3 for soil improvement.
 - 5.5 List FOUR bulky organic materials used as organic soil mulches, including chipped bark products, leaf mould, composted straw products, cocoa shell.
 - 5.6 Compare the benefits and limitations of each of the materials listed in 5.5 for use as a mulch.
 - 5.7 Describe FOUR methods of composting garden waste, including aerobic and anaerobic methods, production of leaf mould and the use of wormeries.
 - 5.8 Describe the contribution made by earthworms, bacteria and fungi to the organic matter content of the soil.
 - 5.9 State the importance of the ratio of 'green' to 'woody' material in the breakdown of organic matter, and the importance of lime to the composting process.
 - 5.10 Describe what is meant by the term 'green manure' and name TWO plant species that can be grown for this purpose.
 - 5.11 State TWO benefits and TWO limitations of using green manures.
6. Understand the importance of soil pH.
- 6.1 Describe the pH scale and state the pH range that normally supports healthy plant growth.
 - 6.2 Explain the effect that soil pH has on plant selection.
 - 6.3 Describe what is meant by 'lime-induced chlorosis'.
 - 6.4 Name TWO plants that require an acid soil.
 - 6.5 State TWO methods by which soil pH can be raised, including the application of garden lime, use of composted green waste and wood ash.
 - 6.6 State TWO methods by which soil pH can be lowered, including the application of Sulphur and use of an acidic form of organic matter.

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| 7. | Understand plant nutrition provided by soil and growing media. | <p>7.1 List the major and minor (trace) nutrients required for plant growth and development, to include:</p> <p style="margin-left: 40px;">Major nutrients: Nitrogen, Phosphorus, Potassium, Magnesium, Calcium, Sulphur.</p> <p style="margin-left: 40px;">Minor (trace) nutrients: Iron, Manganese, Boron, Copper, Zinc, Molybdenum.
<i>(Chemical symbols are not required for minor nutrients)</i></p> <p>7.2 Describe the typical effects of a deficiency of Nitrogen, Iron, Magnesium and Calcium.</p> <p>7.3 State what is meant by the terms 'organic fertiliser' and 'inorganic fertiliser' and list TWO examples of EACH.</p> <p>7.4 State TWO benefits and TWO limitations of using organic fertilisers and inorganic fertilisers.</p> <p>7.5 State what is meant by: single or straight fertilisers; compound fertilisers. List TWO examples of EACH.</p> <p>7.6 State what is meant by the terms 'Base dressing', 'Top dressing', 'Liquid feed' and 'Foliar feed'. Describe ONE situation where EACH type of fertiliser application would be appropriate.</p> <p>7.7 Describe the use of Controlled Release Fertiliser (CRF) granules and state TWO benefits and TWO limitations of their use in growing media.</p> |
| 8. | Understand the uses of alternative growing media | <p>8.1 Describe the range of compost types available, and the use of EACH of these growing media as alternatives to growing in soil: including peat-based, loam-based, peat-free, multipurpose, ericaceous, seed and cutting and container composts.</p> <p>8.2 Describe the environmental implications of the use of peat, coir and municipal green waste in growing media.</p> |

Maintaining plant health

RHS reference number: R2103

Unit reference number: K/601/0342

Unit guided learning hours: 23

Unit level: Level 2

Credit Value: 3

Unit purpose and aim(s): This unit will enable candidates to develop an understanding of pest, disease and weed life cycles including modes of infestation. Cultural, biological, chemical and integrated systems are explored.

Learning Outcomes

The learner will:

1. Understand the importance of using safe, healthy and environmentally sustainable practices for the maintenance of plant health.

2. Understand the problems posed by weeds in horticulture and how these problems can be minimised.

Assessment Criteria

The learner can:

- 1.1 State what is meant by biological, chemical, physical (or cultural) and integrated methods of pest and disease control.
- 1.2 Describe ONE example of each type of control named in 1.1.
- 1.3 State the benefits and limitations of using each of the types of control named in 1.1.
- 1.4 Describe how risks to people and the environment can be minimised when using the control methods stated in 1.1.
- 1.5 State the importance of natural balances in plant protection and describe how garden practices can disturb this balance.
- 1.6 Describe methods which can be used to restore and maintain these natural balances to minimise the need for pesticides.
- 1.7 Describe how the selection of plants can help to avoid plant health problems, including the choice of resistant cultivars and growing plants appropriate to a situation and soil.
- 2.1 Describe what is meant by a weed.
- 2.2 Describe how weeds reduce crop productivity and reduce the visual appeal of plantings for display.

- 2.3 Describe the role of weeds as alternative hosts for plant pathogens.
 - 2.4 Describe the biology of ephemeral, annual and perennial weeds.
 - 2.5 State the botanical names of TWO examples of EACH of the types described in 2.4.
 - 2.6 Describe how the types of weed described in 2.4 relate to horticultural situations, including recently cultivated soil; herbaceous perennial borders; woody perennial plantings; and lawns.
 - 2.7 State the botanical names of TWO weeds associated with EACH of the situations described in 2.6.
 - 2.8 State what is meant by contact, residual, translocated and selective herbicides, and describe ONE situation where EACH type would be used appropriately.
 - 2.9 State the active ingredient of ONE example of EACH type of herbicide described in 2.8.
3. Know the problems posed by pests in horticulture and ways in which these can be minimised.
- 3.1 Define 'plant pest'.
 - 3.2 Describe the damage caused by rabbits, cabbage white butterfly larva, black bean aphid, two-spotted spider mite, glasshouse whitefly, vine weevil, slugs, snails, and stem (or bulb) eelworm.
 - 3.3 Describe in outline the life-cycles of cabbage white butterfly, black bean aphid, glasshouse whitefly and vine weevil.
 - 3.4 Describe TWO different methods of reducing the effects of EACH of the plant pests named in 3.2; methods should be selected from more than one of the control options (chemical, physical, cultural or biological) available.
 - 3.5 Describe how a knowledge of the life cycles of the cabbage white butterfly, black bean aphid, glasshouse whitefly and vine weevil contribute to the success of their control.

4. Know the problems posed by diseases in horticulture and ways in which these can be minimised.
 - 4.1 Define 'plant disease'.
 - 4.2 Describe the damage caused by grey mould, powdery mildew, damping off, honey fungus, rose black spot, potato blight and clubroot.
 - 4.3 Describe TWO different methods of reducing the effects of EACH of the diseases stated in 4.2; methods should be selected from more than one of the control options (chemical, physical, cultural or biological) available.
 - 4.4 Describe the damage caused by fire blight and describe TWO methods used to limit the spread of the disease.
 - 4.5 Describe the damage caused by TWO named plant viruses.
 - 4.6 Describe TWO methods by which viruses can be spread.
 - 4.7 Describe TWO methods of avoiding the spread of plant viruses.
5. Know the problems posed by plant disorders in horticulture and ways in which these can be minimised.
 - 5.1 Define 'plant physiological disorder'.
 - 5.2 Describe the symptoms of lime-induced chlorosis, and how plants and their growth are affected by frost; shade; drought; and water-logging.
 - 5.3 State ONE method of avoiding EACH of the problems described in 5.2.

Understanding plant propagation

RHS reference number: R2104

Unit reference number: M/601/0343

Unit guided learning hours: 23

Unit level: Level 2

Credit Value: 3

Unit purpose and aim(s): This unit will enable candidates to develop an understanding of the principles and main practices of plant propagation in horticulture.

Learning Outcomes

The learner will:

1. Understand how plant physiology affects the ways in which plants can be propagated.

Assessment Criteria

The learner can:

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| 1. | Understand how plant physiology affects the ways in which plants can be propagated. | 1.1 | Describe the characteristics of plants that can be propagated from seed. |
| | | 1.2 | State FIVE benefits of propagating plants from seed. |
| | | 1.3 | State FIVE limitations of propagating plants from seed. |
| | | 1.4 | Describe the characteristics of plants requiring propagation by vegetative means. |
| | | 1.5 | State FIVE benefits of propagating plants by vegetative means. |
| | | 1.6 | State FIVE limitations of propagating plants by vegetative means. |
| | | 1.7 | State FIVE examples of plants that are propagated from seed. |
| | | 1.8 | State FIVE examples of plants that are propagated by vegetative means. |
| 2 | Understand the appropriate methods of harvesting and storing different types of seed. | 2.1 | Describe the preparation of fleshy berries for seed storage, under the following headings: harvesting; maceration; separation; cleaning and drying. |
| | | 2.2 | State FOUR NAMED examples of seeds requiring cool dry storage. |
| | | 2.3 | State FOUR NAMED examples of seeds requiring cool moist storage. |
| | | 2.4 | State the effect that storage has on the viability and germination potential of seed. |

3. Understand the conditions required for successful plant propagation from seed.
 - 3.1 State the environmental requirements for seeds to germinate successfully: light levels; moisture; temperature; oxygen.
 - 3.2 State the meaning of the term 'seed dormancy'.
 - 3.3 Describe methods of overcoming seed dormancy, including soaking; hot water treatment; nicking (chipping); abrasion; and warm and cold treatments; stating an appropriate plant example for EACH.
 - 3.4 Describe the changes that take place in a germinating seed, including taking in water; rising respiration rate; rapid cell division; and the splitting of the seed coat.
 - 3.5 Describe the preparation of suitable containers and growing media for sowing the following types of seed: fine, medium and large.
 - 3.6 Describe the preparation of a seedbed on an outdoor site
 - 3.7 Describe appropriate methods of sowing seed in containers and in the open ground, including broadcast, sowing in drills and station sowing.
 - 3.8 Describe the care of seedlings to include: provision of the most suitable environmental conditions; watering; the avoidance of pests and diseases; the control of THREE commonly encountered pests and THREE commonly encountered diseases.
 - 3.9 Describe the pricking out into containers, thinning out, or transplanting of seedlings to a new site.
4. Understand the conditions required for successful plant propagation from cuttings.
 - 4.1 Describe the effects of juvenility and plant health on the ability of a section of plant to produce roots/shoots.
 - 4.2 Describe how to collect and prepare the following types of cutting: 'soft tip' (deciduous with leaves); 'semi-ripe' (green wood deciduous with leaves); small hairy or grey-leaved semi-evergreen with leaves; hardwood evergreen with leaves; hardwood deciduous without leaves; and conifers.
 - 4.3 State FOUR NAMED plant examples for EACH type of cutting material described in 4.2.

- 4.4 State a propagation facility that provides the best possible conditions for rooting EACH of the types of cutting described in 4.2. (Examples to include a propagator, mist bench, cold frame, and the open ground.)
- 4.5 State the environmental conditions required by EACH of the types of cutting described in 4.2.
- 4.6 Describe how to manage the environment (temperature, moisture, airflow) to encourage the rooting process and help to avoid THREE NAMED pests and THREE NAMED diseases.
- 4.7 Describe the aftercare of cuttings, including the removal of diseased, dying or dead material; feeding; and hardening off in preparation for potting off.
- 5 Understand how to propagate specific plants using appropriate vegetative techniques.
 - 5.1 Describe how to propagate by division ONE NAMED plant of EACH of the following types: a suckering shrub; a fibrous-rooted perennial; a perennial with distinct buds (eyes).
 - 5.2 Describe how to propagate ONE NAMED plant for EACH of the following types of leaf cutting: leaf petiole; leaf lamina; leaf squares; midrib; and chevrons.
 - 5.3 Describe how to propagate ONE NAMED plant by leaf bud cuttings.
 - 5.4 Describe how to propagate ONE NAMED plant for EACH of the following sizes of root cutting: thick (over 2mm diameter); and thin (less than 2mm diameter).
 - 5.5 Describe how to propagate ONE NAMED plant for EACH of the following types of layering: air; simple; and serpentine.
 - 5.6 State the meaning of the terms 'budding' and 'grafting'.
 - 5.7 State FOUR reasons why budding and grafting are carried out.
 - 5.8 State TWO benefits and TWO limitations of grafting.
 - 5.9 Describe how to propagate ONE NAMED plant by EACH of the following types of budding: 'T'; and 'Chip'.

- 5.10 Describe how to propagate ONE NAMED plant by EACH of the following types of grafting: 'whip and tongue' (in the field); 'side veneer graft' (bench grafting).
- 5.11 For EACH method of propagation specified in 5.1 to 5.8, state what aftercare is required to ensure success.