



RHS Qualifications

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

Qualification Specification

From September 2026

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Section 1: About this Qualification

1.1 Aims and objectives of the qualification

This qualification allows learners to develop a level of plant knowledge deemed essential by the horticultural industries. It equips learners with the knowledge and understanding to progress to employment within the horticultural sector. It assesses the knowledge of the scientific principles underpinning horticultural practices and supports career development for those already working in the profession.

It also provides learners the opportunity of personal development, including the changing of careers and engagement in their learning and offers an opportunity to develop transferable skills such as problem solving, implementing management plans/programmes, and communication as part of their applied learning.

It allows learners the opportunity to progress to further learning opportunities at Level 3, and then to higher education, career advancement or entry in the horticultural industries at a more advanced, technical level.

1.2 Entry requirements

There are no pre-requisites for entry to this qualification.

1.3 Guided Learning Hours (GLH) and Total Qualification Time (TQT)

The Guided Learning Hours (GLH) represent the time that the learner spends learning under the immediate guidance and supervision of a tutor and includes assessment by the tutor, as well as invigilated exams. Guided Learning Hours are always less than total qualification time, as learners are expected to complete a certain amount of study in their own time. The Guided Learning Hours for this qualification is 120.

Total Qualification Time (TQT) includes the Guided Learning Hours and represents the notional time that an average learner could reasonably expect to take to complete the learning outcomes of the units to the standard determined by the assessment criteria and gain the qualification. It includes all face-to-face contact with tutors as well as assessment time and unsupervised directed study, coursework and practice. The Total Qualification Time for this qualification is 180.

1.4 Assessment methods

This qualification will be entirely assessed by two externally set and marked examinations:

- The first examination covers Units 1-4
- The second examination covers Units 5-8

In each examination, questions will be drawn from content across Learning Outcomes within each unit. All Learning Outcomes/Assessment Criteria will be covered across three examination series.

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

All assessments must be conducted in accordance with the RHS requirements.

1.5 Grading

Both examinations carry equal weighting. Learners must achieve a minimum of 50% in each examination and must pass both to be awarded the qualification.

The final overall grade will be determined by combining the marks from both examinations and converting this total into an overall percentage.

Grades will be awarded as follows:

50-64%	Pass
65-79%	Merit
80%+	Distinction

1.6 Learning Resources

There is a wide range of books, online material and other learning resources published which support the studies of those learning horticulture. RHS Qualifications does not recommend or endorse any specific learning resources as meeting the needs of learners studying for RHS qualifications. Learners are encouraged to seek guidance from their tutors on which learning resources will best support their studies, or to choose the most appropriate resources to support the qualification requirements and their needs from the wealth of material available.

1.7 Approved Centres

RHS Qualifications can only be delivered by approved centres. Further information regarding the approval process can be found at: rhs.org.uk/qualifications.

1.8 Learner Registration

All learners must be registered with RHS Qualifications at the commencement of this qualification through the RHS Qualifications Web Portal. More information about the registration process is available from RHS Qualifications.

1.9 Reasonable Adjustments and Special Consideration

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

Special consideration is given following the examination to learners 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 documents 'Access Arrangements and Reasonable Adjustments Policy for Approved Centres' and 'Special Consideration Policy for Approved Centres'. These documents are available on the RHS website (rhs.org.uk/qualifications), 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 learner. Application must be made within specified timescales.

1.10 Fees

For a full list of fees please see the RHS Qualifications Fees Notice. This document is available on the Qualifications page on the RHS website and on the RHS web portal. All fees are payable prior to confirmation of entry for any examination.

1.11 Late Entries

RHS Qualifications publishes annually, and distributes to Approved Providers, 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.

1.12 Enquiry about Results service

An enquiry about results service is available from RHS Qualifications. Further information about this service is available on our website at rhs.org.uk/qualifications

1.13 Appeals

The appeals procedures are available on the RHS Qualifications web portal and on the RHS website rhs.org.uk/qualifications

1.14 Replacement Certificate (if lost, damaged or destroyed)

The fee for a replacement certificate can be found on the RHS Qualifications Fees Notice. Requests for a replacement certificate must be sent to the Qualifications Department.

1.15 Malpractice and Maladministration

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 learners 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 rhs.org.uk/qualifications

Section 2: Unit specifications

2.1 Unit List

1.	Plant Science I
2.	Plant Health
3.	Plant Nutrition
4.	Plant Specification
5.	Plant Science II
6	Planting Styles
7.	Horticulture and Society
8.	Biodiversity

2.2 How to read the unit specification

Each unit has the same format. This is as follows:

Unit aim	Sets out the aim of the unit and summarises the learning and assessment within it.
Learning outcome	The learning outcome sets out what a learner must know or be able to do. The learning outcome is a broad statement capturing the overall learning for that outcome.
Assessment criteria	The assessment criteria set out what the learner can demonstrate to show that they have met the requirements for assessment. Each criterion includes a command verb which sets the level of demand and depth of knowledge and understanding required.

2.3 Definition of command verbs

The following list provides a definition of the command verbs used in the specification to provide more detail about the level of demand and depth of knowledge and understanding expected. These command verbs should be read in the context of the level descriptor for this qualification, which appears before the list of command verbs.

Further information about level descriptors for the Regulated Qualifications Framework can be found in the Ofqual Handbook [here](#)

Level descriptor for Level 2

	The learner....	The learner can....
Level 2	Has knowledge and understanding of facts, procedures and ideas in an area of study or field of work to complete well-defined tasks and address straightforward problems. Can interpret relevant information and ideas. Is aware of a range of information that is relevant to the area of study or work	Select and use relevant cognitive and practical skills to complete well-defined, generally routine tasks and address straightforward problems. Identify, gather and use relevant information to inform actions. Identify how effective actions have been.

Command verbs used in this specification

Command verb	Use at Level 2	Examples
Describe	Provide a brief description of a well-defined context, situation or fact	Describe how.... Describe the role of.... Describe the impact of....
Explain	Provide an explanation of well-defined facts, procedures or processes	Explain why.... Explain how.... Explain the importance of....

Command verb	Use at Level 2	Examples
Identify	Be able to name or know on sight the meaning of well-defined terminology, application of terms, concepts, processes, procedures or tasks.	Identify the meaning of.... Identify the concept of.... Identify the function of....
Outline	Give brief details that cover the main points of detailed information	Outline legal control measures... Outline the impact of....

Unit 1 - Plant Science I

Unit aim

The understanding of plant naming, along with a formal study of form and function provides a knowledge base that is fundamental to all horticulturists.

This unit introduces the learner to plant growth and development, starting with investigating how plants are named, before moving on to consider the technical language used by horticulturists to describe, classify and identify plant species. Learners explore the different structures and tissues found within the plant, developing a knowledge of their functions and distinguishing characteristics.

Plant growth processes are explored, the impacts of the environment on the function of the plants understood and the increasing impacts of climate change on the plant appreciated.

Learning outcome 1 - Understand scientific and common plant names

Assessment criteria

1.1 Identify the meaning and application of the following terms within a horticultural context, to include:

- plant taxonomy
- family
- genus
- species
- cultivar
- variety
- hybrid

1.2 Identify the concepts of Plant Breeders' Rights (PBRs), restrictions on propagation when applied to a named variety and penalties for non-compliance

1.3 Describe the concept of major plant groups, to include:

- angiosperms
- gymnosperms
- pteridophytes
- bryophytes
- monocotyledonous plants
- eudicotyledonous plants

1.4 Describe how external characteristics can be used to group plants into family, genus, species, cultivar and variety

1.5 Describe how growth stage impacts on external characteristics

Learning outcome 2 – Understand life cycle adaptations

Assessment criteria

2.1 Identify life cycle adaptations and characteristics, to include:

- ephemeral
- annual
- biennial
- perennial (herbaceous)
- perennial (woody)

2.2 Describe the advantages of life cycle adaptations, to include:

- exploitation of short growing season
- avoidance of extreme weather conditions
- ecological niches
- growth in less favorable conditions

2.3 Explain the impact of plant lifecycles on biodiversity, plant selection and design

2.4 Explain the impact of climate change on plant lifecycles, biodiversity, plant selection and design

Learning outcome 3 – Understand external parts of the plant

Assessment criteria

3.1 Identify characteristics of external plant structures

3.2 Describe how the characteristics are used to identify and describe plant species

3.3 Describe how external plant structures are used to identify plant taxa

3.4 Describe how the characteristics of external plant structures support their function and horticultural importance

3.5 Explain the impact of external plant structures on horticultural performance, plant care and husbandry

Additional information

Structures include:

- Roots: fibrous, tap, root cap, hair
- Stems: nodes and internodes, bud types, arrangement, lenticels, bark
- Leaves: margin, shape, venation, arrangement and function
- Flowers: floral parts of typical eudicotyledonous and monocotyledonous flowers
- Inflorescence structures, seed heads

AC 3.4 e.g. leaf arrangement enables efficient light capture for photosynthesis.

AC 3.5 e.g. defense against pest and disease attack, or the establishment, spread and colonisation of new areas in weed biology e.g. impact of lifecycle, rhizomes.

Learning outcome 4 – Understand internal plant structures

Assessment criteria

4.1 Identify the characteristics, arrangement, function and horticultural importance of internal structures, to include:

- Root: xylem, phloem, cambium, epidermis, endodermis
- Stem: xylem, phloem, cambium, epidermis, cortex, pith
- Leaf: xylem, phloem, epidermis, lamina, stomata, palisade & spongy mesophyll

4.2 Describe the importance of internal structures for growth and transportation of carbohydrates, nutrients, and water around and out of the plant

4.3 Explain how internal plant structures influence horticultural practice

Additional information

AC.4.3 e.g. modes of action of plant pests, the impact of plant diseases on internal structures of the plant.

Learning outcome 5 – Understand pollination and fertilisation

Assessment criteria

5.1 Identify the functions of plant parts involved in pollination and fertilisation, to include:

- peduncle
- pedicel
- receptacle
- sepals
- petals

- stamen
- anther
- filament
- pollen grain
- stigma
- style
- ovary
- ovule

5.2 Describe processes for cross-pollination

5.3 Describe methods to promote pollination and increase fruit/seed production, to include:

- selecting sites for plantings
- creating microclimates
- selecting suitable pollination partners

5.4 Describe the impact of temperature conditions, light levels, humidity and nutrition on pollination and fertilisation in different plant species.

5.5 Describe the impact of changes in populations of pollinating animals.

Learning outcome 6 – Understand photosynthesis and respiration

Assessment criteria

6.1 Describe the process of photosynthesis and respiration in plants

6.2 Describe the importance of photosynthesis and respiration for plant growth

6.3 Describe how the law of limiting factors affects photosynthesis and its horticultural implications

6.3 Explain the impact of the presence of abiotic factors on photosynthesis and respiration, to include:

- the role of specific plant nutrients in chlorophyll production
- the effects of wind and pest attack on photosynthetic area
- the implications of climate change on the relationship between photosynthesis and respiration

Learning outcome 7 – Understand the movement of water through the plant

Assessment criteria

7.1 Describe the process of water uptake and movement through the plant

7.2 Describe the process of transpiration

7.3 Describe the impact of environmental factors on water uptake and movement, to include:

- soil moisture
- temperature
- relative humidity
- wind
- sunlight

7.4 Describe plant-based strategies for drought management, to include:

- wilting
- hairy leaves
- early senescence
- waxy cuticles
- succulent foliage
- leaves with reduced surface area

7.5 Describe the impact of horticultural practices on water availability, to include:

- planting densities
- relative humidity
- shading
- nutrient uptake
- timing of planting

7.6 Describe the impact of soil structure and growing media formulation on water uptake

Unit 2 – Plant Health

Unit aim

This unit provides learners with an essential understanding of the factors that may influence plant health.

Horticulturists manage and mitigate the different factors that can impact plant health.

Plants are subject to a wide range of abiotic factors, some of which favour plant growth, while others are detrimental, for example, wind and frost can have significant negative impact on plant growth, as can extremes in relative humidity, an over or undersupply of plant nutrients, or the presence of weeds.

Plant health also involves the systematic study of pests, diseases and pathogens to develop strategies that allow the horticulturist to prevent or mitigate problems as they arise.

This is a dynamic area of study, with climate change playing an increasing role in the introduction of new plant health risks.

Learning outcome 1 – Understand environmental conditions

Assessment criteria

1.1 Describe the impact of abiotic conditions on the growth of named plant species, to include:

- temperature
- wind
- water
- relative humidity
- light levels
- oxygen

1.2 Describe the impact of environmental conditions and a changing climate on horticultural practices

Additional information

AC1.2 includes:

- selection of plants that are less affected by identified abiotic factors
- mitigation of site limitations to create growing conditions suitable for a wider range of plants
- impacts on long lived species

Learning outcome 2 – Understand plant nutrition and plant health

Assessment criteria

2.1 Identify the symptoms of nutritional deficiencies, to include:

- effect of nutrient mobility
- macronutrients and elements required for plant growth: nitrogen, phosphorus, potassium, calcium, sulphur, magnesium, carbon, oxygen, hydrogen
- micronutrients: iron, boron, manganese, and molybdenum

2.2 Describe the impact of plant nutrition on the growth characteristics of plants

2.3 Describe the impact of poor plant nutrition on plant health, to include:

- growth
- vigour
- yield
- cold resistance
- disease susceptibility
- flowering potential

2.4 Describe the benefits of good soil management and mulching

Learning outcome 3 – Understand the impact of competition on plant health

Assessment criteria

3.1 Outline the legal control measures for weeds e.g. Wildlife and Countryside Act 1981
Environmental Protection Act 1990

3.2 Describe the benefits of weeds as cover crops, nutrient recyclers, habitats and food sources

3.3 Describe the disadvantages of weeds

3.4 Describe the control measures (where this is necessary) for weeds/invasive species and other unwanted vegetation, to include:

- cultural
- physical
- chemical

3.5 Describe how planting sites, weed biology, availability of plant nutrients and pH contribute to the successful control of weeds and invasive species

3.6 Explain the negative environmental impacts of weed control methods

Additional information

AC3.2 e.g. competition with plants for water, nutrients, physical space, and sunlight, host for pests and pathogens

AC3.4 The RHS only recommends chemical herbicides in specific cases of invasive weed control, such as Japanese knotweed, and only when applied in a controlled way by specially trained operators.

AC 3.5 e.g. cultivation of soil, chemical control

Learning outcome 4 – Understand pests and pathogens

Assessment criteria

4.1 Identify ways in which pests and pathogens are introduced to a site

4.2 Outline the impact of economic threshold, resistant cultivars, humidity on plant health decisions

4.3 Outline the restrictions and opportunities offered by different growing systems e.g. organic cultivation practices, conventional cultivation practices and minimal cultivation practices

4.4 Outline the legal requirements for pest control

4.5 Describe the impact of pests and pathogen presence on plant health

4.6 Describe the concept of notifiable pests and diseases including actions required when identified

4.7 Describe how temperature influences fecundity

4.8 Describe the control measures to prevent and manage outbreaks of pests and pathogens, to include:

- physical
- cultural
- chemical
- biological

4.9 Describe the intended and unintended impacts of control measures on biodiversity

4.10 Explain the benefits of Garden Health Plans as holistic tools to manage plant health

Additional information

AC4.8 Whilst there are chemical treatments available, the RHS has a policy not to use these.

AC4.9 - Garden Health Plans consider the entire range of potential impacts on plant health, while considering the mitigations that can be carried out to manage these threats.

Integrated Pest Management is a component part of Garden Health Plans, along with the management of other abiotic factors.

Learning outcome 5 – Understand biosecurity and plant passports

Assessment criteria

5.1 Outline the impact of site-specific factors on biosecurity

5.2 Describe the role of biosecurity in ensuring plant health on a garden, regional and national basis

5.3 Describe the impact of a changing climate on pests and pathogens

5.4 Describe the role and purpose of plant health legislation

Additional information

AC5.4 e.g. UK plant passports and phytosanitary certificates

Learning outcome 6 – Understand how to maintain plant health

Assessment criteria

6.1 Outline the role of Garden Health Plans to strategically mitigate and manage plant health risks

6.2 Describe the relationship between plant health status and resilience to pests and pathogens

6.3 Describe techniques that can be applied to keep plants healthy

6.4 Describe the role of resistant cultivars/species

Additional information

AC6.2 e.g. plant spacings, planting depth, abiotic factors

AC6.3 includes the need to ensure that the right plants are chosen for the right conditions to ensure good plant health

Unit 3 – Plant Nutrition

Unit aim

This unit introduces learners to the principles of plant nutrition.

There are few areas of horticulture that are faster moving, or that have such profound impacts on sustainability and climate change than plant nutrition. The carbon released from manufacture, such as the Haber Bosch process, is a key and significant driver of climate change.

In this unit, learners will understand how the horticulturist applies scientific principles and best practice to minimise environmental damage, while enhancing biodiversity and wellness when creating gardens and designing landscapes.

This process includes the specification of plants for places, the formulation of growing media, the sustainable management of soils as a precious resource.

Learning outcome 1 – Understanding soil types and profiles

Assessment criteria

1.1 Outline the impact of climate change on soil quality

1.2 Outline the concept and purpose of Soil Management Plans

1.3 Describe different soil types

1.4 Describe the impact of soil on plant growth, health and selection, to include:

- texture
- structure
- topsoil
- subsoil
- organic matter

1.5 Describe the impact of soil loss and degradation on plant growth

1.6 Describe techniques to ameliorate soils, to include:

- aeration
- compaction
- drainage

Learning outcome 2 – Understand the role of nutrients

Assessment criteria

- 2.1 Outline the impact of nutrient deficiencies on plant health, growth and development
- 2.2 Describe the function of macronutrients and elements required for plant growth: nitrogen, phosphorus, potassium, calcium, sulphur, magnesium, carbon, oxygen, hydrogen
- 2.3 Describe the function of micronutrients: iron, boron, manganese, and molybdenum.
- 2.4 Explain the impact of nutrient regimes on the growth of plants
- 2.5 Explain the impact of soil and growing media on nutrition
- 2.6 Explain the importance of plant selection strategies to minimise inputs

Additional information

AC2.4. e.g. promotion of vegetative growth, promotion of flowering and fruiting

AC2.5 e.g. root penetration in compacted soil, inappropriate pH

Learning outcome 3 – Understand soil-based nutrition

Assessment criteria

- 3.1 Outline the advantages and limitations of organic and synthetic fertilisers and manures
- 3.2 Outline processes to review and remove fertilisers in sustainable horticulture
- 3.3 Describe the principles of soil-based nutrition, to include:
 - natural nutrient cycles
 - the fixation of atmospheric nitrogen
 - the role of microbial activity in the release of nutrition
- 3.4 Describe the role of soil micro-organisms on making plant nutrients available
- 3.5 Describe the role of different types of fertiliser as sources of plant nutrition
- 3.6 Describe how the manufacture of fertiliser contributes to climate change
- 3.7 Explain the importance of the rhizosphere in nutrient uptake

3.8 Explain the importance of plant selection to reduce or eliminate the need for the addition of plant nutrients

3.9 Explain the impact of eutrophication of water bodies through leachate

Additional information

AC3.5 - Different types of fertilisers – includes natural fertiliser teas, the use of green manures and the use of biochar, organic fertilisers and seaweed extract

Learning outcome 4 – Understand the principles of pH and nutrient availability

Assessment criteria

4.1 Outline protocols used when collecting and testing soil to determine pH

4.2 Describe the Impact of pH on nutrient uptake

4.3 Describe the impact of incorrect pH on the health of existing plant species

4.4 Describe the role of good plant selection to reduce corrective actions

4.5 Describe the role of Garden Health Plans to include:

- species selection
- mitigations

4.6 Explain the impact of pH level mitigation on soil ecology

Learning outcome 5 – Understand bulk constituents for growing media

Assessment criteria

5.1 Describe the characteristics of the following bulk constituents and their environmental footprint:

- coir
- composted organic matter
- sheep's wool
- bracken
- leaf litter
- composted bark
- wood fibre
- digestate
- loam

- perlite
- sand
- vermiculite
- rockwool
- forest residue
- grit

5.2 Outline the advantages and limitations of bulk constituents for plant growth

5.3 Describe the formulation of the following composts:

- seed
- multi-purpose
- potting
- soil-based
- ericaceous
- aquatic
- orchid
- cactus

5.4 Describe the impact on plant health of growing plants in an inappropriate growing media

5.5 Explain the environmental impact of peat

5.6 Outline the environmental implications of different bulk constituents to include:

- carbon footprint
- habitat loss from extraction
- contamination

Additional information

AC5.5 Peat usage includes historic use of peat, the removal of peat in growing media.

Unit 4 – Plant Specification

Unit aim

Horticulturists develop sites into gardens and designed landscapes through reference to scientific findings, best practice and models of sustainable thinking.

Plant specification is a critical component of this process, both from the selection of plant species, but also through sustainable procurement.

The basic principles of 'right plant right place' are applied within this topic.

This unit also allows learners to develop their understanding of Plant specification, through the integration of knowledge from the Plant Science, Plant Health and Plant Nutrition units to enable them to consider the factors that influence and determine the specification of plants for specific locations and purposes.

Learning outcome 1 – Understand site-based criteria

Assessment criteria

1.1 Describe site factors that impact plant establishment and growth

1.2 Describe how site factors can impact planting decisions

1.3 Describe how climate change can impact site factors

1.4 Describe techniques of working with a site's natural aspects to minimise the need for mitigation interventions

1.5 Explain how natural habitat determines plant requirements

Additional information

AC1.1 and AC1.2 must include:

- aspect
- topography
- exposure/shelter
- light/shade
- soil type
- drainage/water management
- microclimates
- size of planting site

AC1.5 e.g. an alpine plant may require cool, dry, well drained conditions

AC1.7 e.g. pest and pathogens

Centres are reminded that they can add their own horticultural contexts to topics, planting sites can therefore include productive growing areas, or decorative areas.

Learning outcome 2 – Understand plant-based criteria

Assessment criteria

2.1 Describe how plant science can inform plant selection, to include:

- hardiness
- aspect
- water needs
- environmental tolerances
- soil types

2.2 Describe how plant requirements can inform plant selection, to include:

- hardiness
- exposure
- soil type/drainage
- temperature
- water
- light/shade

2.3 Describe sustainable practice in plant selection and establishment

2.4 Describe how changing climate conditions can impact plant selection

2.5 Describe how the presence of known site issues can impact plant selection

2.6 Describe how the following factors influence plant selection:

- RHS recommended (formerly Award of Garden Merit (AGM))
- hybrids, F₁ hybrids, F₂ hybrids
- clones and clonal selection
- resistant hybrids/varieties/cultivars

Learning outcome 3 – Understand plant specifications

Assessment criteria

3.1 Describe factors to consider when ordering plant materials to include:

- plant types
- material type
- production method
- biosecurity
- environmental considerations

3.2 Explain the advantages and limitations of plant material for different horticultural situations

3.3 Describe the impact of plant specification on biosecurity

3.4 Describe the environmental impacts of plant specification

Additional information

AC3.3 e.g. material source

AC3.4 e.g. the concept of carbon and water footprints

Learning outcome 4 – Understand processes for receiving plant material on site

Assessment criteria

4.1 Describe processes for receiving plant material on site, to include:

- receipt and quality checks
- plant passporting information
- heeling in/storage of plant material

4.2 Describe indicators of plant quality issues, to include:

- presence of pest or disease
- poor growth
- old stock
- weed infestations
- pot-bound

4.3 Outline the process for reporting problems to the relevant plant health authority

4.4 Explain Implications of accepting poor quality plant material and actions to prevent this

4.5 Explain the advantages of quarantining new plant material to prevent plant health problems

Additional information

AC4.3 reporting problems e.g Animal and Plant Health Agency (APHA) in England and Wales, Science & Advice for Scottish Agriculture (SASA) in Scotland and Department of Agriculture, Environment and Rural Affairs (DAERA) in Northern Ireland

AC4.4 Implications – includes biosecurity risks

Learning outcome 5 – Understand planting and post-planting care

Assessment criteria

5.1 Describe the process of planting, to include:

- soil amelioration
- position
- spacing
- plant density
- depth of planting
- firming
- staking
- irrigation/water management
- fertiliser requirements
- mulching

5.2 Explain the importance of planting practices and post-planting care for plant establishment and growth

5.3 Describe the advantages and limitations of different staking and support systems on both plant establishment and development of resilience

5.4 Identify the impacts of poor planting practice on establishment

5.5 Explain the importance of cultural factors on establishment and plant health

5.6 Describe the impact of weed management on plant establishment and biodiversity

Additional information

AC5.4 e.g. incorrect addition of organic matter

AC5.5 e.g. timing of planting and post planting care

Learning outcome 6 – Understand how to maintain new plantings

Assessment criteria

6.1 Outline the purpose, timing and components of maintenance tasks for the first 12 months after planting, to include:

- weed control
- irrigation/water management
- removal of dead plant material
- checking/replacing stakes and guards
- mulching

6.2 Identify the reasons for recording failure rates

6.3 Describe the relationship between maintenance tasks and plant establishment and growth

6.4 Outline the use of Garden Health Plans to ensure successful establishment of new plantings, to include:

- irrigation/water management
- nutrition
- identification and mitigation of stress
- timings of maintenance operations
- impact of operations on soil and plant health
- investigation into causes of failure

Unit 5 – Plant Science II

Unit aim

This unit builds on unit 1 – Plant Science I, to consider the incredible range of plant material that horticulturists work with.

Plants are adapted to survive in a diverse range of environments. Plants exhibit a wide range of leaf types, stems that climb or can support large networks of branches, roots that can both absorb water, but which can store carbohydrates and flowers that can ensure cross-pollination. Seeds can survive for thousands of years, along with a wide range of growth habits and lifecycles that range from weeks to hundreds of years.

Plant breeders through the years have enhanced these adaptations, which are often part of the garden merit of a particular species making the study of this area fascinating and rewarding to the horticulturist.

Learning outcome 1 – Understand leaf adaptations

Assessment criteria

1.1 Identify the range of leaf adaptations, to include:

- hairy
- waxy
- coloured
- rolled
- variegated
- reduced
- succulent
- oils
- aerenchyma cells
- bulbs
- leaf tendrils
- twining leaf petioles

1.2 Describe the 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
- Climbing

1.3 Describe the horticultural uses of leaf adaptations, to include:

- implication of leaf adaptation on plant selection
- prediction of plant cultural and environmental preferences
- function to include air quality, shade, water absorption
- resilience
- benefits for biodiversity

1.4 Explain how leaves can be used for propagation (totipotency)

Learning outcome 2 – Understand stem adaptations

Assessment criteria

2.1 Identify the features of stem adaptations, to include:

- secondary thickening/wood
- physical defence, including thorns
- tendrils
- twining stems
- stolons
- tubers
- runners
- glandular hairs or ducts containing essential oils
- corms
- rhizomes

2.2 Describe the advantages of stem adaptations for the plant, to include:

- defence from herbivory
- support
- enhanced light
- water storage
- carbohydrate storage
- resilience to weather conditions.

2.3 Describe the horticultural uses of stem adaptations, to include:

- climbing plants
- decorative stem/trunk adaptations
- colonisation of areas
- creation of habitats for wildlife
- impact on suitability for different design styles

2.4 Explain how stems can be used for propagation (totipotency)

Learning outcome 3 – Understand root adaptations

Assessment criteria

3.1 Identify the features of root adaptations, to include:

- fibrous
- tap
- foraging
- tropisms
- adventitious buds
- tubers
- pneumatophores
- root nodules in legumes
- adventitious roots/prop roots

3.2 Describe the advantages of root adaptations for the plant, to include:

- anchorage/support
- water/nutrient uptake
- orientation
- search for nutrition and water
- reproduction
- carbohydrate storage
- water storage
- gaseous exchange

3.3 Describe the maintenance implications of root adaptations to include:

- colonisation
- impact of oxygen levels in soil on roots
- impact to hard landscaping/grassed areas
- weed control
- transplanting

3.4 Explain how roots can be used for propagation (totipotency)

Learning outcome 4 – Understand flower adaptations

Assessment criteria

4.1 Identify the features of flower adaptations, to include:

- flower arrangements (inflorescence)
- timing of flowering
- petals (bright/reduced)
- scent
- nectar

- hermaphrodite
- monoecious
- dioecious
- quantity and characteristics of pollen

4.2 Describe the advantages and functions of flower adaptations for the plant, to include:

- enhancing pollination
- linking pollen characteristics to vectors of pollination
- favouring cross-pollination

4.3 Describe the horticultural uses of flower adaptations to include:

- planting/design styles/aesthetics
- supporting pollinators
- biodiversity

Learning outcome 5 – Understanding seed adaptations

Assessment criteria

5.1 Identify the features of seed adaptations, to include:

- quantity of seed produced
- dispersal mechanism
- dormancy mechanisms to include physical and physiological
- seed coats
- storage of fats and oils
- orthodox
- recalcitrant

5.2 Describe the advantages of seed adaptations for plant dispersal (geographically and in time)

5.3 Describe the benefits of seed adaptations for germination, to include:

- light
- moisture
- temperature

5.4 Outline techniques to overcome dormancy in horticultural situations, to include:

- washing
- scarification
- stratification

5.5 Explain the impact of seed adaptations on biodiversity and garden design

5.6 Explain the impact of dispersal mechanisms and soil seed bank on horticultural maintenance

Learning outcome 6 – Understand growth habit adaptations

Assessment criteria

6.1 Describe the features of growth habit adaptations, to include:

- low to ground (alpines)
- clump forming herbaceous perennials
- upright growth
- horizontal growth
- woody
- herbaceous
- evergreen
- deciduous

6.2 Outline the advantages of growth habit adaptations to the plant, to include:

- optimising microclimates
- surviving adverse winter conditions
- ecological services

6.3 Explain the suitability of growth habit adaptations for different garden situations and planting styles

6.4 Describe how plant growth habit affects biodiversity

Unit 6 – Planting styles

Unit aim

Horticulturists apply their knowledge of plants, biodiversity, and the way people interact with plants to develop the gardens and landscapes in their care. Units 5-8 unit bring these aspects of horticulture together.

Learners are introduced to the concept of planting styles, investigating formality and informality within gardens, the design characteristics of historical landscapes and gardens to allow them to appreciate the way that horticulture is used in preserving and interpreting heritage.

This unit also covers the use of plants in gardens, from screens and boundaries, through to the provision of shade, and the art of combining plants to create gardens.

Horticulturists do not just create beautiful spaces; they also grow the fruit and vegetables that we eat. Horticulturists are increasingly engaging with communities in the growing of vegetables to impact on wider societal issues, this aspect is also considered within this unit.

This unit also allows learners to explore productive growing in the context of edible landscapes.

Learning outcome 1 – Understand historical contexts

Assessment criteria

1.1 Identify key design characteristics of historical landscapes and gardens most relevant to the heritage sector, to include:

- Renaissance gardens
- Landscape style
- Picturesque style
- Gardenesque style
- Arts and Crafts gardens
- The wild garden
- Modern garden styles

1.2 Describe how features and plantings are appropriate to the period and style

1.3 Describe actions that might be taken to rectify features or plantings that do not conform to the period or style

1.4 Explain how historical styles influence garden design today

Additional information

AC1.4 – includes the role of horticulture in preserving and interpreting representative histories and heritage, changing attitudes towards nature over time and the impact of heritage on garden design, establishment and maintenance

Learning outcome 2 – Understand formal planting

Assessment criteria

2.1 Identify features of formal planting styles, to include:

- straight lines, geometric shapes
- symmetry
- formal hedges
- hedges to restrict planted areas
- monochromatic or dichromatic planting schemes
- planting in even numbers
- formal ponds

2.2 Describe how formal elements and plantings are appropriate to the planting style

2.3 Describe actions that might be taken to rectify features or plantings that do not conform to planting style

2.4 Explain the impact of formal plantings on sustainability and biodiversity

Additional information

AC2.2 includes the use of formal planting styles to present living histories and to explore issues e.g. public displays of power and dominance over nature, plant adaptations suitable for use in formal plantings e.g. leaf, stem and habit.

AC2.4 Sustainability impacts of formal lawns to include:

- monocultures
- water management
- nutrition
- weed control

Learning outcome 3 – Understand informal planting

Assessment criteria

3.1 Identify the features of informal plantings and their design function, to include:

- irregular shapes within design
- plantings less restricted by shape and free flowing
- full-colour palette
- planting in odd numbers
- planted water features
- structure and shape as well as flowering for woody perennials

3.2 Describe the importance of features and plantings being appropriate to the planting style

3.3 Describe actions that might be taken to rectify features or plantings that do not conform to planting style

3.4 Explain the impact of informal plantings on biodiversity

Additional information

AC3.2 includes plant adaptations suitable for use in informal plantings e.g. leaf, stem and habit, the use of informal planting styles to present living histories e.g. the role of William Robinson in championing naturalistic planting styles.

Learning outcome 4 – Understand plant associations

Assessment criteria

4.1 Identify the principles of plant associations, to include:

- colour
- height
- form
- seasonal interest

4.2 Explain the importance of interrelationships between plant species including appropriateness of colour, height, form and flowering times

4.3 Explain the importance of selecting plant material that reflects both the design ethos and the heritage of the site

4.4 Describe the impact of plant choices on the wider environment and biodiversity

Additional information

AC4.1 includes the use of garden situations to inform the grouping of plants

AC4.3 includes the roles of plant adaptations when considering plant associations, e.g. leaf size and shape, growth habit

Learning outcome 5 – Understand plant uses

Assessment criteria

5.1 Identify the uses and purposes of plants within a garden, to include:

- height
- structure
- shade
- wildlife
- horizontal planes
- vertical lines
- screens
- boundaries
- ecosystem services
- climate mitigation

5.2 Describe the implications of poor plant selection on the use and purpose of plants in a garden to include:

- height
- structure
- shade
- wildlife
- horizontal planes
- vertical lines

- screens
- boundaries
- ecosystem services
- climate mitigation

5.3 Explain how plant adaptations may influence plant use

Learning outcome 6 – Understand edible landscapes

Assessment criteria

6.1 Identify planting styles suitable for edible landscapes including herbs, fruit and vegetables

6.2 Describe the principles of growing systems, to include:

- traditional
- organic
- biodynamic

6.3 Describe the purpose of potagers, containers and accessible edibles

6.4 Identify appropriate plant support structures to meet design characteristics of the wider garden/landscape

6.5 Explain the social impact of edible landscapes, to include:

- social inclusion
- green social prescribing

Additional information

AC6.4 e.g. bamboo canes, oak obelisks, includes the sustainability impact of plant supports
e.g. bamboo canes

AC6.5 e.g. The role of community orchards, allotments, the incredible edible movement, community gardens and guerrilla gardening for health, wellbeing and biodiversity.

Learning outcome 7 - Understand short-term plantings

Assessment criteria

7.1 Identify the characteristics of plant species suitable for short-term plant displays
e.g. traditional bedding, mazes, annual meadows

7.2 Identify plants suitable for seasonal display, to include:

- annuals
- half-hardy annuals
- bulbs
- shrubs
- short-lived perennials

7.3 Describe the positive and negative environmental impact of seasonal plant displays

Additional information

AC7.3 includes the environmental and biodiversity impacts of the production of bedding plants for short-term seasonal display, the carbon and water footprint of short-term plant displays

Unit 7 – Horticulture and society

Unit aim

The role that horticulture plays in enhancing health and wellbeing is receiving increasing recognition. Horticulture, at its best, connects people, builds communities, creates beauty and improves the lives of all.

The green spaces horticulturists create positively impact on peoples' lives. These spaces change behaviours, they improve both physical and mental health, they support environmental resilience, they build stronger communities and can reinforce cultural identity.

The importance of horticulture in wellness, therapy, social inclusion and community cohesion is one of the most exciting horticultural developments in recent years.

Learning outcome 1 – Understanding wellbeing

Assessment criteria

1.1 Identify the social benefits of gardening, to include:

- physical health
- mental health
- social inclusion
- reduction in antisocial behaviour

1.2 Identify the social benefits of:

- urban greening
- allotments
- domestic gardens, parks, botanical and heritage gardens

1.3 Describe how the design of gardens can promote:

- health
- mindfulness
- wellbeing

1.4 Explain the historic role of horticulture in improving the lives of people

Additional information

AC1.3 e.g. the links between horticulture and nature, the development of nature therapy

AC1.4 e.g. the development of movements such as the Arts and Crafts movement, the development of parks

Learning outcome 2 – Understanding environment

Assessment criteria

2.1 Identify the positive impacts of horticulture on the environment, to include:

- carbon storage in soils and plant tissue
- plant ecosystem services including air quality improvement, temperature regulation, noise reduction, flood mitigation and water management
- biodiversity

2.2 Identify the negative impacts of horticulture, to include:

- carbon footprint
- machinery emissions
- peat extraction
- single use plastic
- water management
- heating of glasshouses and structures
- waste and end of life impacts

2.3 Outline the principles and implications of climate change

2.4 Describe the environmental benefits of:

- urban greening
- allotments
- domestic gardens
- parks
- botanical and heritage gardens

2.5 Describe sustainable horticultural practices, to include:

- the carbon footprint of plants
- water management
- composting of green waste
- soil carbon management with no dig systems
- alternatives to plastics

2.6 Explain how horticultural practices can support the environment and ecosystems

Additional information

AC2.3 includes the impact of climate change on planting styles and biodiversity

Learning outcome 3 – Understand the impact of horticulture on the UK economy

Assessment criteria

3.1 Identify the key features of UK horticultural sectors, to include:

- garden tourism
- garden maintenance and landscaping
- plant production
- retail
- food production
- arboriculture

3.2 Describe the scale and value of ornamental horticulture to the UK economy, to include:

- garden tourism
- garden maintenance and landscaping
- retail
- ornamental plant production

3.3 Describe the additional value of horticulture, to include:

- social inclusion
- increased biodiversity
- reduced crime
- improved health and wellbeing

Learning outcome 4 – Understand community horticulture

Assessment criteria

4.1 Identify types of community horticultural projects and their impact, to include:

- community and school growing projects
- Britain in Bloom
- therapeutic horticulture
- social enterprises
- parks and public green spaces
- community kitchens in gardens

4.2 Identify the benefits of community projects, to include:

- helping to reduce social isolation
- contributing to positive physical mental health and wellbeing
- bringing communities together
- making people proud of where they live
- the supply of fresh food
- engagement in and ownership of food production

4.3 Describe the benefits that community projects and volunteering bring to the preservation of heritage gardens, local green spaces and the development of biodiverse plantings

Unit 8 – Biodiversity

Unit aim

Green spaces, especially within urban communities, can have huge implications on biodiversity. Horticulturists apply their knowledge of plants, planting styles and community to enhance biodiversity.

Therefore, as they create and maintain gardens and designed landscapes, horticulturists can have a profound impact on biodiversity.

Within this unit learners are introduced to the concept of biodiversity, considering the principles of food chains, the relationships between primary and secondary consumers, the impacts of climate change on plants, the importance of habitats within horticultural sites, the role of citizen science projects to monitor biodiversity and the concept and impacts of biodiversity action plans.

Learning outcome 1 – Understanding plants and biodiversity

Assessment criteria

1.1 Identify the basic principles of a food chain/web, to include:

- Producers
- Primary, secondary and tertiary consumers

1.2 Describe the relationship between plant diversity and associated primary and secondary consumers in a habitat

1.3 Describe the importance of re-evaluating concepts about plants and biodiversity

1.4 Describe the role of botanical gardens in conservation and education

1.5 Describe how plant selection can influence biodiversity

1.6 Describe how natural plantings can benefit local communities

1.7 Describe the value of developing private gardens as biodiverse spaces

Additional information

AC1.1 includes the potential of plant species in the provision of food for pollinating insects, and habitats for plants, animals and fungi

AC1.2 e.g. ragwort and cinnabar moth, the positive impact on biodiversity of wildflower plantings e.g. food for pollinators

AC1.3 e.g. considering pests/weeds from a biodiversity perspective

AC1.6 The positive impact on biodiversity of wildflower plantings e.g. food for pollinators, birds and small mammals

Learning outcome 2 - Understand the impact of climate change

Assessment criteria

2.1 Identify the impact of climate change on plants, to include:

- temperature
- humidity
- water management
- emerging new pests and pathogens

2.2 Identify the criteria to consider when selecting plant material, to include:

- water management
- provenance
- hardiness
- heat tolerance
- susceptibility to spreading and emerging pests and diseases
- weather extremes, changes in phenology

2.3 Describe the impact of using non- native plant species including resilience and biodiversity

Additional information

AC2.1 includes the impact of climate change on existing plantings

AC2.2 includes plant selection for climate change resilience and biodiversity

Learning outcome 3 – Understand habitat creation

Assessment criteria

3.1 Identify the features of habitats in horticultural sites, to include:

- layering of plantings
- diversity of habitat e.g. groundcover, trees, hedges, traditional orchards, unmanaged grass, bare soil and ponds
- nesting sites
- shelter
- food
- overwintering/hibernation sites
- access for foraging animals
- habitat corridors
- soil

3.2 Explain how gardens can be maintained and designed to create habitats and encourage wildlife

Additional information

AC3.2 includes plant associations/planting styles suitable for creating habitats, selection of plant species with adaptations that favour wildlife, the benefits of wildlife for local communities

Learning outcome 4 – Understand citizen science and species surveys

Assessment criteria

4.1 Identify the requirements of wildlife present in gardens, to include:

- wildflowers
- small mammals
- birds
- invertebrates

4.2 Describe the role of citizen science projects to identify species' population trends e.g. RSPB Big Garden Bird Watch and Butterfly Conservation Big Butterfly Count

4.3 Explain how to identify and record wildlife in a horticultural situation and use data to inform habitat creation

4.4 Describe appropriate plant associations/planting styles suitable for creating habitats

4.5 Describe a selection of plant species with adaptations that favour wildlife

Learning outcome 5 – Understand biodiversity policies and legislation

Assessment criteria

5.1 Identify the features of biodiversity policies and legislation, to include:

- purpose
- importance
- UK and devolved nation legislation
- UK policies

5.2 Describe the impact of biodiversity policies and legislation on garden maintenance decisions

5.3 Describe the impact of biodiversity policies and legislation within community horticulture, heritage horticulture and the creation of garden styles

Additional information

AC5.3 e.g. incorporation of standing deadwood into a formal or historic garden

Section 3 – Delivery information

This qualification may be delivered in a variety of ways, but it is recommended that tutors encourage learners to apply knowledge and understanding through practical contexts to gain a thorough understanding of the theoretical and conceptual knowledge within the specification.

Application could be encouraged through:

- Visits to gardens to observe the planting and management of a variety of plant species
- Lectures from experts in plant management
- Lectures from horticulturists working across a variety of contexts e.g. different types of gardens, working with different plant species
- Practical work carried out in identifying and managing plant species in own garden or in place of employment

Alongside the knowledge in the learning outcomes and assessment criteria, there is an expectation that learners will gain a knowledge and understanding of the following areas which are relevant to general horticultural practice and are also reflected in particular learning outcomes and assessment criteria within the specification.

Health and Safety

- Knowledge of, and compliance with, current legislation as it relates to horticulture
- The management of risk within horticulture
- The storage, care and maintenance of PPE, tools and equipment in horticultural settings.

Sustainability

The impact of horticulture on the wider environment, with specific reference to:

- Reduction of the negative impacts of horticultural practices
- The contribution of horticulture to the three pillars of sustainability (economic viability, social equity and environmental protection)
- The concept that horticulture should be net-positive, benefiting the wider environment
- The impact of horticulture on climate change
- The impact of climate change on horticulture.

Best Practice

- Professional approaches and techniques
- Professional use of named plant species in a wide range of horticultural settings
- Horticultural practices which are professional, current, effective and sustainable
- The adoption of trials results, research and development findings.

Equality and diversity

- Knowledge and compliance with all current legislation as it relates to horticulture
- The concepts of respect, fairness and dignity
- Negative impacts of poor practice to include discrimination, victimisation and harassment
- The advantages of inclusive cultures.