

NextGen: HN unit specification

Plant Biology (SCQF level 7)

Unit code: JCOJ 47

SCQF level: 7 (16 SCQF credit points)

Valid from: August 2026

This unit specification provides detailed information about the unit to ensure consistent and transparent assessment year on year. It is for lecturers and assessors, and contains all the mandatory information you need to deliver and assess the unit.

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Unit purpose

This unit gives learners an understanding of the main structures that develop in the plant life cycle, and of the physiological processes behind them. It is suitable for learners studying HNC Horticulture, and provides a foundation in the principles and theory for more advanced study in plant science, biotechnology and plant husbandry.

Entry requirements and progression routes

Entry to this unit is at your centre's discretion. While learners would benefit from previous horticultural knowledge or experience, they do not need it to study the unit.

Before they start, however, we recommend that learners have completed one or more of the following:

- NC Horticulture at SCQF Level 5, ideally to include some level 6 units
- SVQ Horticulture at SCQF Level 6, or equivalent
- a relevant City & Guilds qualification at level 6
- a minimum of one Scottish Higher at grade C or above, or one A-level at grade D or above
- other equivalent qualifications
- relevant industry experience

If learners are studying the unit as part of HNC Horticulture, they may be able to progress to HND Horticulture, or go directly into employment in the horticulture industry.

Unit outcomes

Learners who complete this unit can:

1. describe plant structure, growth and life cycles
2. explain plant physiological processes
3. describe the factors that affect plant growth

Evidence requirements

Outcome 1

Learners must gather evidence that demonstrates that they can:

- describe key aspects of plant taxonomy and botanical naming of:
 - the main plant divisions: bryophyta, pteridophyta, pinophyta, magnoliophyta
 - monocotyledons, basal angiosperms, eudicots (core and basal)
 - hybrids, cultivated plants
- describe the structure and function of plants, including:
 - cellular structures: cell membrane, cell wall, main organelles
 - plant organs and their growth and development
 - vascular and non-vascular transport systems
- describe the plant growth cycle of a range of plant divisions, including:
 - alternation of generations, and sporulation
 - sexual reproduction and methods of seed dispersal
 - asexual reproduction
 - effects of plant hormones

You can assess learners using a project in which they show their understanding of plant development.

Outcome 2

Learners must gather evidence that demonstrates that they can:

- explain the major physiological processes in plants, including:
 - photosynthetic pathways (C3, C4 and CAM)
 - respiration
 - osmosis
 - transpiration and evapotranspiration
 - translocation and partitioning of assimilates
- explain the physiology of major plant growth stages, including:
 - germination
 - bud formation
 - secondary growth
 - senescence
 - dormancy

You can assess learners using a portfolio in which they show their knowledge and understanding of plant processes.

Outcome 3

Learners must gather evidence that demonstrates that they can:

- describe major limiting factors that affect plant growth, including:
 - abiotic: light, temperature, carbon dioxide (CO₂), water, nutrients,
 - biotic: pests, diseases, intra- and interspecific competition
- explain how soil properties have an impact on plant growth and development, including:
 - physical: texture, structure, water-holding capacity
 - chemical: pH, nutrient availability, deficiency and toxicity, organic matter
 - biological: soil macrofauna, soil mesofauna, and soil microfauna

You can assess learners using a case study of a specific plant or plant group. This could be integrated with other activities in the course.

It may also be possible to assess outcomes 1, 2 and 3 holistically using a project.

Knowledge and skills

Knowledge	Skills
Outcome 1 Learners should understand: - principles of plant taxonomy - structure and function of plants - stages of plant growth cycles in relation to structure and function	Outcome 1 Learners can: - apply taxonomic principles to plant naming - identify and name plant parts - identify the stages of plant growth
Outcome 2 Learners should understand: - mechanisms of major plant processes - importance of plant nutrients and the effect of deficiencies	Outcome 2 Learners can: - explain the importance of major plant processes - identify the essential elements for plant growth and the symptoms of some deficiencies in major elements
Outcome 3 Learners should understand: - how to explain the importance of major plant processes - how to identify the essential elements for plant growth and the symptoms of some deficiencies in major elements - how biotic and abiotic factors can affect plant growth - how soil properties have an impact on plant growth and development	Outcome 3 Learners can: - identify the effects of abiotic and biotic factors on plants - differentiate between physical, chemical and biological properties of soil, and explain how they have an impact on plant growth

Meta-skills

You must give learners opportunities to develop their meta-skills throughout this unit. We have suggested how to incorporate the most relevant ones into the unit content, but you may find other opportunities.

Self-management

This includes focusing, integrity, adapting and initiative. The most relevant are:

- focusing
 - concentrating on understanding scientific terms and processes; sorting and filtering relevant and useful information
- adapting
 - nurturing resilience to external circumstances, such as weather conditions and soil quality, that affect plant health; critically reflecting on performance and decisions
- Initiative
 - thinking independently; taking responsibility for decision making

Social intelligence

This includes communicating, feeling, collaborating and leading. The most relevant are:

- communicating
 - giving and receiving information effectively
- collaborating
 - working with others on group tasks and projects

Innovation

This includes curiosity, creativity, sense-making and critical thinking. The most relevant is:

- curiosity
 - asking questions; sourcing information
 - identifying problems

Literacies

This unit provides opportunities to develop the following literacies.

Numeracy

Learners develop their numeracy skills as they carry out a variety of scientific calculations throughout their studies.

Communication

Learners enhance their communication skills in the research they carry out for their portfolio.

Digital

Learners improve their digital skills and computer literacy in the research they carry out for their e-portfolio.

Learning for Sustainability

Throughout this unit, you should encourage learners to develop their skills, knowledge and understanding of sustainability.

This includes:

- a general understanding of social, economic and environmental sustainability
- a general understanding of the United Nations Sustainable Development Goals (SDGs)
- a deeper understanding of subject-specific sustainability
- the confidence to apply the skills, knowledge, understanding and values they develop in the next stage of their life

Delivery of unit

This is a mandatory unit in HNC Horticulture.

It is designed to provide learners with important underpinning knowledge and understanding of plant classification, morphology, structure and function. They can then apply this knowledge in a range of activities in HNC Horticulture.

You should teach this unit alongside other units in the course. You can integrate it with units such as Production Horticulture or Designing Gardens and Greenspace.

Your initial focus in delivery should be on developing learners' underpinning knowledge, which becomes more relevant and applicable as they study other units. You can spread delivery of this unit over the year.

Additional guidance

The guidance in this section is not mandatory.

Content and context for this unit

Describe plant structure, growth and life cycles (outcome 1)

This outcome looks at taxonomy and the botanical names of plants according to current practices.

Of the more than 10 plant divisions, you should cover at least:

- bryophyta
- pteridophyte
- pinophyte
- magnoliophyta

Take the levels of classification down to genus, species and cultivar, and instruct learners on the correct method of botanical naming.

You should highlight the distinguishing features of monocotyledons, basal angiosperms and eudicots (core and basal), including pollen, leaf vein and flower structure.

Learners should be able to identify the major external and internal anatomy of external and internal in the divisions listed, including:

- root
- rhizome
- shoot
- leaf
- bud
- storage organs
- xylem

- phloem
- cambium
- casparian band
- meristems

You should explore plant reproduction, covering:

- sexual and asexual reproduction, and vegetative propagation, and the impact of these different processes on species and survival
- sporulation in mosses and ferns, and the distinction between the naked seed of gymnosperms and coated seed of angiosperms
- sexual reproduction in angiosperms, from the formation of gametes to pollination fertilisation, and seed formation and dispersal
- the influence on plant health, and plant growth and development, of substances like auxins, gibberellins, cytokinins, abscisic acid and ethylene, including on:
 - root initiation and growth
 - apical dominance
 - leaf formation and abscission
 - fruit set
 - ripening
 - senescence
- the effects of practices such as disbudding, pruning and pinching out

Explain plant physiological processes (outcome 2)

This outcome covers the main plant physiological processes, including:

- germination:
 - required events
 - sequence

- photosynthesis:
 - site of the light reaction
 - evolution of O₂
 - fixation of CO₂
 - a simple representation of the events
 - end products of the dark reaction
- respiration:
 - raw products
 - energy production
 - the by-products of water and CO₂
- net photosynthesis:
 - explained in terms of the gross, photosynthesis, respiration and photorespiration
 - partitioning of assimilates, source–sinks in plants
- transpiration:
 - soil–plant atmosphere continuum
 - movement of water by osmosis
 - adhesion theory
 - stomatal function
- translocation:
 - movement of products around the plant
 - source–sink movement of resources
- secondary growth and wood formation

You should also explain:

- dormancy
- bud formation
- breaking dormancy
- transition from heterotrophic to autotrophic growth

You should help learners to identify essential nutrients for growth, and understand the function of major nutrients, minor nutrients and trace nutrients. They should also understand the importance of NPK (nitrogen–phosphorus–potassium) ratios, and investigate their effect on growth. Conversely, they should explore the effects major nutrient deficiencies on plant physiology and physical symptoms. You can also cover examples of toxicity.

Describe the factors that affect plant growth (outcome 3)

This outcome looks at the factors affecting plant growth and the concept of limiting factors. You should cover:

- abiotic factors:
 - the effect of light quality, humidity, CO₂ supplementation and temperature range on the rate of photosynthesis
 - the influence of soil type and pH on water and nutrient availability, and subsequent plant function
 - the importance of water in plant processes, and the influence of balance on growth and morphology that affect root–shoot ratios and relative growth increment
 - stomatal conductance and the factors affecting transpiration, along with nutritional regimes and effects on plant growth and morphology, including leaf form and flowering

- biotic factors:
 - the effect of competition on growth, either between species or within, and explain the influence of planting density or in limiting resources including light, water and nutrients
 - the effect of pests and diseases on the physiology of plant processes, such as the loss of cell tissue, production of toxins and disruption of normal growth and development
- adaptations to pest and disease
 - physical characteristics and the production of chemicals

Resources

Centres delivering this qualification must have suitably qualified staff for each of the subject components. Your centre should already have established processes to ensure staff are appropriately qualified to deliver in this subject area.

Assessors and internal verifiers must hold an industry and/or subject-specific qualification equivalent to the qualification. Centre staff should have relevant industry experience and be able to demonstrate industry-relevant CPD to maintain their subject-specific knowledge and skills.

Equality and inclusion

This unit is designed to be as fair and as accessible as possible with no unnecessary barriers to learning or assessment.

You must consider the needs of individual learners when planning learning experiences, selecting assessment methods or considering alternative evidence.

Guidance on assessment arrangements for disabled learners and those with additional support needs is available on the [assessment arrangements web page](#).

Information for learners

Plant Biology (SCQF level 7)

This information explains:

- what the unit is about
- what you should know or be able to do before you start
- what you need to do during the unit
- opportunities for further learning and employment

Unit information

This unit provides you with knowledge of the main structures that develop in the plant life cycle, and gives you an understanding of the physiological processes that take place. It is suitable for those studying HNC Horticulture.

On completion of this unit, you can:

- describe plant structure, growth and life cycles
- explain plant physiological processes
- describe the factors that affect plant growth

Prior knowledge and skills

While you would benefit from previous horticultural knowledge or experience, you do not need it to study the unit.

Before you start, however, we recommend that you have completed one or more of the following:

- NC Horticulture at SCQF Level 5, ideally to include some level 6 units
- SVQ Horticulture at SCQF Level 6, or equivalent
- a relevant City & Guilds qualification at SCQF level 6

- a minimum of one Scottish Higher at grade C or above, or one A-level at grade D or above
- other equivalent qualifications
- relevant industry experience

Assessment

You are likely to be assessed by a project that covers all three outcomes with evidence presented in the form of a portfolio.

Future progression and employment

Studying this unit provides you with a foundation in the principles and theory for more advanced study in plant science, biotechnology and plant husbandry. On completion of this unit, you may be able to progress to HND level study in Horticulture or a related subject, or directly into employment in the horticulture industry.

Meta-skills

Throughout this unit, you develop meta-skills that are useful for the horticulture sector.

Meta-skills are transferable behaviours and abilities that help you adapt and succeed in life, study and work. There are three categories of meta-skills: self-management, social intelligence and innovation.

Self-management

You develop self-management meta-skills as you focus on learning a considerable volume of scientific terms and processes, and as you sort and filter pertinent information. As circumstances change, you develop critical reflection skills, which help you think independently and make informed decisions.

Social intelligence

You develop social intelligence skills, particularly in communicating, as you learn to give and receive information effectively.

Innovation

You develop innovation meta-skills as you learn to recognise problems and source information.

Learning for Sustainability

Throughout this unit, you develop skills, knowledge and understanding of sustainability.

You learn about social, economic and environmental sustainability principles and how they relate to the horticulture sector. You also develop an understanding of the [United Nations Sustainable Development Goals](#).

Administrative information

Published: October 2026 (version 1.0)

Superclass: SA

History of changes

Version	Description of change	Date

Please check [our website](#) to ensure you are using the most up-to-date version of this unit.

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