

UNIT 14: CARING FOR PLANTS (INTERMEDIATE)

ABOUT THIS UNIT

In this unit you will care for plants and investigate how their production and maintenance is based on applying an understanding of basic plant biology and genetics, and controlling the environment in which they are growing.

You will learn:

- about environment control and the way it is used to create the best conditions for plant growth
- how different approaches to husbandry can be used to produce the same product under different conditions
- about the organisms that cause disease and damage to plants
- how planning and good husbandry can be used to reduce the risk of problems arising and the impact of any that do occur
- how to take responsibility for the care of a plant population
- practical and observational skills required when working with plants
- how to keep appropriate records to monitor growth, the care provided and the environmental conditions in which the plants are growing.

Caring for plants allows progression from Foundation optional Unit 5: Growing plants. It builds on the topics found in compulsory Intermediate Unit 2: Learning knowledge & understanding needed for scientific work, and Unit 3: Applying scientific knowledge, understanding & skills. This unit also complements Edexcel optional Intermediate Unit 9: Managing your own environment, and links with units from the Intermediate GNVQ in Land & Environment. It also provides understanding and practical experiences that are important for those who wish to work with plants.

This unit will be assessed only through an external assessment. The grade you achieve in this assessment will be your grade for the unit.

WHAT YOU NEED TO LEARN

Plant growth

You will need to know how to recognise:

- the signs that indicate healthy plant growth (for example normal growth, leaves that are undamaged and the correct colour, no signs of pests)
- the symptoms that indicate poor growth or disease (for example abnormal growth, damaged and discoloured leaves, evidence of pests on the plant).

You will need to understand how different environmental factors can influence plant growth, with a focus on:

- light
- temperature
- water
- carbon dioxide
- rooting medium

- nitrates (nitrogen), phosphates and potassium salts (potash)
- pH levels
- competition from other plants.

You will need to know how these environmental factors are controlled in enterprises to:

- increase growth and production
- improve the quality of the product
- help control disease and damage.

Plant breeding

You will need to understand the basic principles of genetics and how characteristics are passed from one generation to the next.

You will need to understand the role of each of the following in the process of inheritance and breeding:

- chromosomes
- genes
- dominant and recessive characteristics
- phenotype and genotype
- parental and F1 generations
- pure-bred stock, hybrids and mutations.

You will need to demonstrate that you understand:

- the mechanisms of monohybrid inheritance where there are dominant and recessive alleles
- the principles of meiosis and mitosis
- that a gene is a section of DNA
- that gender is determined genetically.

You will also need to understand the advantages and disadvantages of propagating plants by seed and by vegetative methods, as part of a propagation programme.

Husbandry systems

You will need to know the different approaches to growing plants and producing crops in the land and environment sector, including:

- intensive production – high production levels with high inputs of fertilisers and agrochemicals
- extensive production – lower levels of production with lower levels of input
- organic production – production without the use of artificial fertilisers and agrochemicals.

You will need to understand the potential advantages and disadvantages of each of these systems for producers and consumers.

Healthcare programmes

You will need to be able to give examples of the types of organism that cause disease and damage to plants, including:

- insects
- molluscs
- birds
- mammals

- bacteria
- viruses
- fungi.

You will need to know the problems caused by these organisms in land and environment enterprises. You will also need to know the main types of weed that may compete with named plants being grown in land and environment enterprises (for example cleavers and wild oats may be a problem in cereal crops, Japanese knotweed in natural areas, and bindweed in nursery stock).

You will need to be able to explain how a healthcare programme is used to control pests, diseases and weeds in a land and environment enterprise, including routine measures taken to:

- prevent infection from disease and control infestation from pests and weeds
- control any problems that occur with disease, pests or weeds.

Carrying out a caring activity

You will need to know the environment required by the plants you are caring for.

You will need to understand the importance of maintaining the correct environment for plant growth, especially light, temperature, humidity and ventilation.

You will need to know how to carry out and explain the importance of routine tasks undertaken as part of a caring activity, including:

- watering
- feeding
- monitoring health and environment
- following any hygiene procedures.

You will need to understand the importance of:

- examining plants for any signs of pests, disease or damage
- keeping accurate records of growth and environmental conditions as part of the caring activity
- working safely and following any relevant requirements of the Health and Safety at Work Act 1974 or Health and Safety at Work (NI) order 1978 during the caring activity.

ASSESSMENT EVIDENCE

In the external assessment, you need to produce evidence showing your understanding of:

- the practical day-to-day care of plants
- the methods used to propagate plants
- the purpose and operation of a healthcare programme
- different husbandry systems
- the breeding of plants and the application of genetics to the methods used
- the different types of record that are kept when caring for plants.

Pass To achieve a pass your work must show:	Merit To achieve a merit your work should show:	Distinction To achieve a distinction your work should show:
P1 a clear description of the tasks associated with caring for plants P2 the matching of different methods of propagation to different types of plants, and reasons for their use P3 a description of the purpose and operation of a healthcare programme P4 an explanation of the reasons why different types of husbandry system are used to grow plants P5 recognition of the main principles of genetics that are applied to plant breeding P6 recognition and description of the purpose of records kept when caring for plants.	M1 an explanation of why caring tasks are carried out and their importance for maintaining healthy plants M2 recognition of problems that could occur when caring for plants and how to identify appropriate ways of responding M3 a clear explanation of how genetic principles are applied to plant breeding.	D1 an explanation of strategies that could be introduced when caring for plants, which are aimed at preventing potential problems before they occur D2 an analysis and interpretation of data from plant-care records D3 an explanation of the advantages and disadvantages of different husbandry systems.

ESSENTIAL INFORMATION FOR TEACHERS

Teaching strategies

This unit complements Unit 3b: Caring for animals (Intermediate).

Wherever possible, the knowledge and understanding of plant biology and environmental control should be developed through students having the opportunity to see plants being grown under different commercial conditions, and through direct involvement in their practical care. At this level, students would be expected to carry out any care tasks they are involved in without continual direct supervision.

The length of time they spend on the tasks should be relevant to the type of care involved and sufficient for the activity to support the development of the required knowledge and understanding. For example, it could be an intensive week of activity caring for plants in an environment-controlled greenhouse, or an intermittent activity, extended over a period of time, involving habitat management in woodland.

Understanding the principles of genetics is a requirement common to both this unit and Unit 3b, and therefore only needs to be covered once. However, in this unit, assessment of these principles will be directly related to the way plants are produced.

Sufficient detail of meiosis and mitosis is required to allow students to:

- understand how genetic information is transferred from cell to cell during normal cell division
- appreciate the difference and significance of the process by which the sex cells are produced.

Detailed technical knowledge of the actual processes is not required.

The term ‘organic husbandry systems’ could include nature reserves and other areas being managed for conservation purposes.

It is important that the focus of any caring undertaken provides a relevant opportunity to develop the related knowledge and understanding of nutrition, breeding and healthcare.

Assessment strategies

Students need to understand how plants are cared for in a relevant vocational context. This may be associated with commercial production, or an amenity, recreational or environmental service. Knowing how to care for a few assorted pot plants on a window-sill is not sufficient.

When grading student evidence you should consider the following general qualities that distinguish between the three grades:

- increasing depth and breadth of understanding
- increasing coherence, evaluation and analysis
- increasing independence and originality.

Pass

The emphasis at pass level is on describing principles and identifying the application of basic knowledge and understanding.

Students are not expected to have a comprehensive understanding of pests and diseases in plants, but should be able to describe the basic purpose and operation of a healthcare programme.

Students need to recognise the main principles of genetics that are applied to plant breeding.

Merit

At merit level the emphasis is on accurate explanation of the application of knowledge and understanding – how and why activities are carried out when caring for plants.

Merit students need a greater understanding of genetics. They must be able to explain how the main principles are applied to plant breeding.

Distinction

At distinction level students should be able to apply their knowledge and understanding to explain the principles on which care is based and the advantages and disadvantages of different approaches and systems.

Students must be able to analyse and interpret growth and environmental records presented in graphs and tables.

Key Skills

This guidance highlights the most relevant Key Skills opportunities in this unit. It contains suggestions only. You will need to check that students have produced all the evidence required to meet part A **and** part B of the Key Skills specifications. Students may need to develop additional evidence elsewhere to meet fully the requirements of the Key Skills specifications.

Guidance is referenced in two ways:

K – keys to attainment

These are Key Skills or aspects of Key Skills which students should achieve as they meet the vocational requirements of the units. Only part B of the Key Skill is highlighted – you will need to check that students achieve part A.

S – signposting

These are opportunities that can be incorporated naturally into the learning programme.

APPLICATION OF NUMBER, LEVEL 2			Key Skills Reference
When students are:	They should be able to develop the following Key Skills evidence:		
<ul style="list-style-type: none"> • investigating basic plant biology, genetics and growing environment • recording the variables of light, temperature and humidity levels for the growing environment 	N2.1	Interpret information from two different sources, including material containing a graph.	S
	N2.2	Carry out calculations to do with: <ul style="list-style-type: none"> a amounts and sizes b scales and proportion c handling statistics d using formulae. 	S

COMMUNICATION, LEVEL 2		Key Skills reference
When students are:	They should be able to develop the following Key Skills evidence:	
<ul style="list-style-type: none"> discussing genetic and environmental factors affecting a plant's growth investigating the propagation of plants and how the principles of genetics can be applied 	<p>C2.1a Contribute to a discussion about a straightforward subject.</p> <p>C2.2 Read and summarise information from two extended documents about a straightforward subject. One of the documents should include at least one image.</p>	<p>S</p> <p>S</p>
INFORMATION TECHNOLOGY, LEVEL 2		Key Skills Reference
When students are:	They should be able to develop the following Key Skills evidence:	
<ul style="list-style-type: none"> investigating the propagation of plants and how the principles of genetics can be applied investigating the propagation of plants and how the principles of genetics can be applied 	<p>IT2.1 Search for and select information for two different purposes.</p> <p>IT2.2 Explore and develop information, and derive new information, for two different purposes.</p>	<p>S</p> <p>S</p>

