

Unit 31: Undertake Horticultural Production Techniques – Outdoors

Unit code:	J/600/9974
QCF Level 3:	BTEC National
Credit value:	10
Guided learning hours:	60

● Aim and purpose

This unit aims to provide learners with an understanding of how to undertake horticultural production techniques – outdoors and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

● Unit introduction

Outdoor horticulture production is an important sector within the horticulture industry as the demand for high quality merchandise at competitive prices is increasing. The sector still tends to encompass the more traditional crops, which represent an important and broad section of total horticultural production.

This unit covers production techniques outdoors, the type and range of stock produced. This encompasses both container grown and open ground (bare rooted) crops, and includes trees, shrubs, roses, bedding plants, bulbs, cut flowers, and edible crops.

The unit considers the whole process of outdoor crop production starting at the planning stage, including site and crop selection, location of services and site preparation. Within site preparation learners will look at preparing and surveying open ground for bare rooted stock and the preparation of growing areas for container grown stock. The preparation and establishment of outdoor crops, the management and maintenance of both the crop and site, and the harvesting, grading and marketing of crops, are all integral parts of this unit.

Learners will have the opportunity to be involved in the complete process in order to develop their practical and technical capabilities. This will include crop establishment, soil types and preparation, cultivation and management techniques. Learners will be involved with cropping programmes and maintaining plant health including organic methods and techniques.

As this unit covers the entire production process, learners will also consider different harvesting and grading techniques including manual and mechanical methods. There will be an emphasis on the marketing process and learners will look at different market outlets and how to manipulate production to reflect these differing demands while still returning a profit. There is an emphasis on environmental issues and health and safety and these will be embedded throughout the production process.

● Learning outcomes

On completion of this unit a learner should:

- 1 Know the requirements of site preparation and planning for outdoor crops
- 2 Be able to prepare sites and establish outdoor horticultural crops
- 3 Be able to manage outdoor horticultural crops
- 4 Understand harvesting and grading requirements of outdoor horticultural crops.

Unit content

1 Know the requirements of site preparation and planning for outdoor crops

Outdoor crops: container and open round; types of crops including trees, shrubs, roses, spring bedding plants, bulbs, cut flowers and edible crops

Site preparation: availability of services (mains water, drainage and electricity); soil types; access requirements; structures including production, potting and packing areas; aspect and climate; irrigation requirements; relevant legislation eg planning regulations; Environment Act 1995, Water Act 2003; environmental impact assessment; health and safety

Planning: competition; market access; availability of labour; crop planning

2 Be able to prepare sites and establish outdoor horticultural crops

Preparation methods: current commercial cultivations and preparations; equipment; setting out areas; health and safety; risk assessments; relevant current legislation and codes of practice eg Health and Safety at Work Act 1974, Environment Act 1995

Outdoor crops: container and open ground; types of crops including trees, shrubs, roses, spring bedding plants, bulbs, cut flowers and edible crops

Methods: preparation for sequential cropping and crop rotation; propagation methods eg seeding, cuttings, stratification, plugs, liners; potting; undercutting and transplanting; storage of plant material; planting depth; timing and density; support methods; training; pruning

Soil cultivation: sub-soiling and drainage; water tables; ploughing; spading; harrowing; bed formation; tilth and structure; alleviation of compaction; soil health; nutrients and manures; mulches and coverings; management of soil pH; pH and nutritional status; soil disorders and fertility problems

Media: peat based; peat free; combination mixes

3 Be able to manage outdoor horticultural crops

Production methods: evaluation and comparison of common production methods; temporary covering systems; health and safety; risk assessments; waste and environmental impact management; relevant current legislation and codes of practice, eg Health and Safety at Work Act 1974, Environment Act 1995

Plant health: common pests and diseases; chemical, cultural, biological and integrated pest, disease and weed management; produce assurance scheme requirements; growth control; crop rotation; substrate disorders; crop nutrition; irrigation

Records: computerised and manual management systems, cropping schedules, stock taking, pest and disease management, profit and loss, maintenance programmes

4 Understand harvesting and grading requirements of outdoor horticultural crops

Harvesting and grading: specifications eg colour, size, stage of development; presentation; packaging; labelling; mechanisation and handling methods; waste materials and management; environmental impact; health and safety; risk assessments; personal protective equipment (PPE); relevant current legislation eg Health and Safety at Work Act, Health and Safety Regulations and Environment Act

Maintaining shelf life: storage; cool chain; trolley systems; transport methods

Markets: retail; wholesale; multiple; contract growing; specialist EU standards; plant passports; accreditation schemes; relevant current legislation eg Food Safety Act, Trade Descriptions Act

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 analyse sites for suitability for outdoor cropping [IE]	M1 compare the requirements for both container and open ground production	D1 discuss how relevant legislation affects outdoor crop production
P2 describe planning requirements for outdoor crops [IE]		
P3 evaluate the seasonal factors affecting outdoor cropping [IE]		
P4 clear and prepare sites in readiness for planting outdoor crops [CT,RL,TW,SM,EP]	M2 evaluate different methods and techniques used to establish both container and open ground crops	D2 recommend, in detail, media and soil preparation requirements for outdoor crop establishment
P5 improve and manage the soil condition to meet plant requirements [CT,RL,TW,SM,EP]		
P6 establish crops outdoors [CT,RL,TW,SM,EP]		
P7 ensure that suitable protection from adverse environmental impacts are put in place [CT,RL,SM,EP]	M3 discuss methods of providing environmental protection for outdoor crops in a specified cropping situation	
P8 manage the growth and development of outdoor crops [IE,RL,SM,EP]	M4 present an integrated pest management programme for a selected container and an open ground outdoor crop	D3 justify the nutrient requirement programme for selected open ground and container grown crops at given sites.
P9 harvest or collect and prepare plant material for sale [CT,RL,TW,SM,EP]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P10 work according to best health and safety guidelines and practice [CT,RL,TW,SM,EP]		
P11 analyse methods of ensuring crops are harvested and graded to meet customer and market requirements [IE,IL,SM,EP]		
P12 describe means of dealing with waste and minimising adverse environmental impacts. [IE]	M5 discuss the potential environmental impact of harvesting selected outdoor crops at given sites.	

PLTS: This summary references where applicable in the pass criteria, in the square brackets, the elements of the personal, learning and thinking skills. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers CT – creative thinkers	RL – reflective learners TW – team workers	SM – self-managers EP – effective participators
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Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable facilities, for example production facilities and pack houses, and will link to work experience placements.

The use of as wide a range of techniques as possible is essential. These could include lectures seminars, nursery visits, production practicals, work placements, and internet and library-based research. Delivery should stimulate, motivate, educate and enthuse learners and utilise the framework of personal, learning and thinking skills.

It is essential that tutors stress the importance of safe working practices, legal obligations and effective management in ensuring production operations have a minimal impact on the environment.

Health and safety during both classroom and practical activities must be stressed and full risk assessments should be undertaken before any practical activity.

Environmental and sustainability factors are important when considering and undertaking outdoor production operations.

Tutors should consider integrating the delivery, private study and assessment for this unit with other relevant units and assessment instruments learners are taking as part of their programme of study.

All four learning outcomes are linked in that they follow the production process from the planning process (learning outcome 1) through to the finished product including harvesting and marketing (learning outcome 4). Learning outcomes 2 and 3 deal with the actual production process.

Learning outcome 1 is likely to be delivered through a series of lectures, discussions, visits to nurseries and talks by leading nurserymen. Learner research is an essential part of this unit, and learners will need computer and internet access, plus access to the latest trade magazines and back issues. Lectures and discussions will focus on preparation for outdoor production, plus the planning required for this process. These will be backed up by visits and talks by visiting specialists, giving learners sufficient knowledge to undertake their research.

Learning outcomes 2 and 4 will have a more practical emphasis, with learning outcome 2 dealing with the practical elements of site preparation and crop establishment and learning outcome 4 dealing with harvesting, storage and marketing.

Learning outcome 3 deals with the management and maintenance of crops and will contain both practical and theoretical elements.

It is intended that the majority of practicals for learning outcomes 2 and 3 are undertaken within the centre and it is essential that learners have access to an outdoor production unit, which should include facilities for the production of both open ground and container grown crops. In addition, a full range of modern equipment is required including tractors, rotavators, ploughs, and lifting machinery.

Organised visits to specialised outdoor production nurseries are also required, as is work experience within the centre's nursery facilities. Work placements within nurseries outside the centre should be encouraged, especially where learners have an interest in a specific area of outside crop production.

Although learning outcome 2 is practically based, sufficient time should also be allowed for learners to carry out research. There should also be theory sessions to deliver the underpinning knowledge required to achieve all the criteria.

Learning outcome 3 is also practically based, focusing more on the management of production and learners will require access to management systems. Sufficient time needs to be allowed for lectures, learner research,

visits to nurseries and talks from visiting specialists.

Learning outcome 4 is closely linked with learning outcomes 2 and 3 and, as part of this process, learners should be given the opportunity through practical sessions to harvest, store and market the crops they have produced. Time should be allowed for learners to research possible market providers, and guest speakers from wholesale and retail outlets should be invited to give presentations to learners. This can be reinforced through lectures and discussions.

This unit does include a wide range of practical activities and it is imperative that full risk assessments are undertaken before any practical activity. Where indicated by the risk assessments appropriate PPE should be worn. As far as possible waste should be minimised and activities organised so there is minimum adverse impact on the environment and this should be emphasised to learners.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives **an indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
Assignment 1: Planning and Preparation for Outdoor Crop Production (P1, P2, P3, M1, D1)
Tutor introduces the assignment brief.
Theory sessions: site assessment including health and safety and environmental issues.
Theory sessions: the planning process.
Practical sessions: site assessment of areas for both open ground and container production.
Learner research and recording information from site assessments.
Visiting speakers.
Visits to nurseries.
Assignment 2: Preparation and Establishment of Outdoor Crops (P4, P5, P6, P7, M2, M3, D2)
Tutor introduces the assignment brief.
Theory session: site preparation and plant establishment.
Practical sessions: crop production preparation and planting.
Learner research.
Visiting speakers.
Visits to specialist nurseries.
Assignment 3: Outdoor Crop Management (P8, P10, P12, M4, M5, D3)
Tutor introduces the assignment brief.
Theory session: legislation and waste and environmental impact management.
Theory session: pest and disease management.
Theory session: management systems.
Practical sessions: crop management control systems.

Topic and suggested assignments/activities and/assessment
Practical sessions: crop maintenance.
Learner research.
Visiting speakers.
Visits to specialist nurseries.
Assignment 4: Harvesting, Grading, Storing and Marketing (P9, P11)
Tutor introduces the assignment brief.
Theory session: harvesting, grading and storing.
Theory session: marketing.
Practical session: harvesting, grading, storing and marketing.
Learner research.
Visiting speakers.
Unit review.

Assessment

Where possible, to ensure assessment is fair the size and complexity of all tasks within the assignment should be the same for all learners.

Assessment for P1, P2, and P3 could be in two parts. For the first part, learners would gather information from an agreed site that could be recorded using a laptop or similar device. Evidence could be gathered from observation sheets and from the information learners have gathered. The second part of the assessment could be for learners to analyse the information and present it to the class, including planning requirements and seasonal factors.

For P4, P5, P6 and P7, learners will carry out practical tasks involving the preparation of soil and media and the planting of crops, ensuring suitable protection from adverse environmental impacts is in place. Evidence could be gathered from observation sheets and structured verbal questioning.

For P8, P10 and P12, learners will manage outdoor crops by using appropriate techniques and relevant management control systems to record information. These criteria should be assessed through the observation of practical tasks and by learners compiling a portfolio of evidence detailing the management techniques and systems they have used. This portfolio should include pest and disease management, relevant legislation, health information including risk assessments, and environmental controls.

For P9 and P11, learners should show an understanding of the equipment and methods used to harvest, grade and prepare for sale outdoor produced crops. This could be linked to the crops produced for learning outcomes 2 and 3. Evidence could be derived partly during practical activities using observation and questioning sheets, and from the production of a descriptive leaflet outlining how customer and market requirements may be met.

For M1, learners need to compare the difference between outdoor container crop and open ground production and identify the advantages and disadvantages of each of them. This could be added to the presentation for P1, P2, P3 or included in a guide which could be used by potential customers.

M2 requires learners to demonstrate a thorough understanding of the different methods and techniques used for the establishment of both container and open ground crops. This could be assessed during practical activities using observation sheets and structured questioning.

For M3, learners are required to discuss how environmental protection can be provided to outdoor crops; this must include a comparison of the effectiveness of different methods in a specified cropping situation.

Evidence could be presented as a report or as a verbal or PowerPoint presentation.

For M4, it is essential that learners have the opportunity to be involved in the use of both chemical and biological control methods for pest and disease management. Learners need to carry out a case study on a minimum of two open ground and two container crops and present an integrated pest management programme for each of the chosen crops.

For M5, learners are required to demonstrate an understanding of the possible environmental impacts of the harvesting operation and how these impacts may be avoided or minimised. Evidence could be in the form of an information sheet to be distributed to harvest operatives.

For D1, learners need to demonstrate a clear understanding the relevant legislation associated with outdoor crop production, and how it affects production techniques. Evidence for this can be included within the presentation for P1, P2, P3 and M1.

For D2, learners are required to recommend most valid media and soil preparation requirements for the establishment of outdoor crops establishment on a given site. This could be assessed during practical activities, as with P4, P5, P6, P7 and M2, using observation and question sheets.

For D3, learners are required to justify a nutrient requirement programme for the open ground and container grown crops they have produced for learning outcomes 2 and 3. The information could be presented within a descriptive leaflet or poster.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, D1	Planning and Preparation for Outdoor Crop Production	You are looking at setting up an outdoor production nursery producing both container and field grown stock. You need to survey and analyse a given site and make recommendations for planning and preparing the various areas ready for production.	Practical. Written. Presentation.
P4, P5, P6, P7, M2, M3, D2	Preparation and Establishment of Outdoor Crops	You are required to carry out the preparation and planting of a range of crops, using both open ground and container grown techniques as directed by your tutor.	Practical.
P8, P10, P12, M4, M5, D3	Outdoor Crop Management	You are responsible for monitoring and maintaining the crops you have produced including the management control systems. You are required to implement and monitor a suitable management programme in order to ensure successful production of these crops.	Practical. Written.
P9, P11	Harvesting, Grading, Storing and Marketing	You are now required to harvest, grade, store and market the crops you have produced. This will include the production of an explanatory leaflet describing the methods used.	Practical and leaflet.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Land-based sector suite. This unit has particular links with:

Level 2	Level 3
Participate in Horticultural Crop Production Outdoors	PH5 Promote the growth and development of crops PH6 Control the preparation of a site for planting PH7 Control the planting of crops PH12 Plan and maintain the collection of orders
	Establish and Manage Exterior Plant Displays
	Undertake Estate Skills
	Undertake Horticultural production Techniques-Protected
	Manage Advanced Nursery Stock Production
	Understand the Principles of Organic Crop Production

Essential resources

Centres offering this unit should ensure that learners have supervised access to appropriate resources, either at the centre or at nearby commercial premises. Facilities required for this unit must include access to a range of crop production resources. Sufficient cropping areas and a range of plant types are required to give learners adequate experience of the work environment. Facilities must reflect those found in professional horticultural organisations in the local area, and should give learners the opportunity to develop their practical abilities.

The equipment and consumables required include a range of plants, both edible and ornamental crops, a suitable propagation area and media, hand tools, pedestrian controlled equipment, packing and grading facilities, crop support and irrigation equipment. First aid and hand washing facilities should also be available.

Employer engagement and vocational contexts

This unit focuses on practical aspects of horticultural crop production and will give learners the background knowledge relating to a variety of crops and techniques used in commercial crop production. Centres are encouraged to create and develop links with a range of specialist nurseries, wholesalers and retailers in order that visits can be arranged and guest speakers utilised.

In addition, there is a range of trade shows organised nationally and regionally, and within their visits programme centres should allow at least one visit to one of these shows to enable learners to gather technical information and speak to people within the industry.

Indicative reading for learners

Textbooks

Bell B and Cousins S – *Machinery for Horticulture, 2nd Edition* (Old Pond Publishing, 1997) ISBN 0852 363699

Lamb K, Kelly and Bowbrick P – *Nursery Stock Manual* (Grower Books, 1995) ISBN 978-1899372041

Journals

Commercial Greenhouse Grower

Good Fruit Grower Magazine

Horticulture Week

Nurseryman and Garden Centre

Vegetable Grower Magazine

Websites

www.assuredproduce.co.uk

www.cgma.gov.uk

www.defra.gov.uk

www.environment-agency.gov.uk

www.hdc.org.uk

www.hsa.gov.uk

www.hta.gov.uk

www.lantra.co.uk

www.pestmanagement.co.uk

Assured Produce

New Covent Garden Market

Department for Environment, Food and Rural Affairs

Environment Agency

Horticulture Development Committee

Health and Safety Executive

Horticultural Trades Association

Lantra Sector Skills Council

Integrated Pest Management Resource Centre

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are ...
Independent enquirers	planning and surveying areas for outdoor plant production analysing equipment and methods used to harvest, prepare for sale and grade outdoor crops
Creative thinkers	comparing the maintenance requirements of crops in containers to crops in the ground designing and implementing pest and disease management programmes
Reflective learners	undertaking practicals and adapting ideas as required
Self-managers	organising themselves to undertake practical activities using and implementing management control systems
Effective participators	harvesting and marketing crops.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	researching information using the internet
Creative thinkers	undertaking practical activities and trying out new techniques and ideas
Reflective learners	evaluating their performance during practicals
Team workers	working with other learners whilst undertaking practical activities
Self-managers	organising time and resources and prioritising actions in relation to assignments
Effective participators	discussing and debating with tutor and other learners during timetabled sessions.

● Functional Skills – Level 2

Skill	When learners are ...
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	using portable ICT technology to gather and record information using the internet to research and gather information using computers to record and evaluate information eg management control systems
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> • text and tables • images • numbers • records 	
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	using IT systems for PowerPoint presentations
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	

Skill	When learners are ...
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	calculating the size of areas and number of plants for crop production pricing and marketing crops
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting information to tutor and other learners during classroom presentations debating and discussing in classroom situations
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	gathering information from journals/textbooks and websites
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	compiling reports, records and other written evidence.