

Unit 34: Understand the Principles of Organic Crop Production

Unit code:	D/600/9849
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 the principles of organic crop production 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

The need to review attitudes to soil health, crop production and the relationship between man and nature is becoming more important with the development of increased environmental awareness and the demand for organically produced food. This unit develops the skills and knowledge practitioners of organic horticulture need and an understanding of the issues involved in marketing and establishing a commercial organic venture.

Learners will examine the background, philosophy and aims of the organic movement and the role of regulating standards, as well as covering practical horticultural skills and the value of crop rotation. Opportunities to market organic produce will be investigated, together with the practical and economic issues that need to be addressed when setting up an organic growing business.

Learners will have the opportunity to observe and examine different soils, compost making and soil improvement methods. The relationship between plants and soil micro-organisms will be covered. Methods of pest, disease and weed management suitable for use within an organic system, and the value of good environmental husbandry, will be discussed and learners will look at beneficial insects and predators and ways of promoting environmental diversity and habitats.

● Learning outcomes

On completion of this unit a learner should:

- 1 Understand the principles of organic crop production
- 2 Understand the importance of soil fertility in an organic system
- 3 Understand growing methods and markets for organic crops
- 4 Understand methods of pest, disease and weed management in organic systems.

Unit content

1 Understand the principles of organic crop production

History, philosophy and aims of the organic movement: history; the relevance of ancient and traditional agricultural practices; leading figures and organisations eg Sir Albert Howard, Eve Balfour, Lawrence D Hills, The Soil Association, Garden Organic (Henry Doubleday Research Association); the law of return (Howard); the importance of sound science; characteristics of organic systems; the development and consequences of artificial chemical use in non-organic crop production

Related systems: biodynamics; agroforestry; permaculture

Organic standards and certification: European Union (EU) regulations; aims of national and international organisations, standards and certifying bodies eg The Soil Association; registration procedures and costs; conversion; timing; inspection; derogation; record keeping; labelling regulations; organic seeds

2 Understand the importance of soil fertility in an organic system

The living soil: soil analysis; structure; fertility; humus; earthworms; the soil nutrient cycle (decomposition of organic material, action of soil organisms, non-biological reactions, soil micro-organisms, protozoa, bacteria-feeding nematodes, vesicular arbuscular mycorrhiza)

Soil erosion: causes; preventative measures; soil conservation

Building and maintaining soil fertility: cultivation; crop rotation; intercropping; supplementary nutrients; rooting depths; mulching; compost; aerobic; anaerobic; ideal conditions; carbon—nitrogen ratio; types of compost heap; soil improvers; animal manures; green manures; nitrogen fixers; fertility builders; rhizobia; comfrey and liquid teas; wormeries

3 Understand growing methods and markets for organic crops

Crops and growing: organic growing methods for a selection of crops eg potatoes, brassicas, alliums, beets, cucurbits, salads, legumes, soft fruit, top fruit; types and varieties; seed and sowing; companion planting; modules; crop care; irrigation; weeds; diseases; pests; harvest; storage; health and safety; personal protective equipment (PPE); relevant current legislation and codes of practice

Marketing and economics: retail outlets; packers; supermarkets; wholesalers; direct marketing; box schemes; farmers' markets; community-supported agriculture (CSA); cooperatives; net sales; farm shops; processing; consumer contact; presentation; packaging; economics; business planning; machinery; equipment; facilities; labour; transportation

4 Understand methods of pest, disease and weed management in organic systems

Pest and disease management: monocultures, biodiversity; plant health; crop rotation; variety selection; companion planting; cultural control; biological control; permissible biocides; life cycles and preferred habitats of beneficial insects and predators; bio-fumigation

Weed control: tillage; direct control (mechanical, manual, thermal, mulching); crop rotation; tools and machinery; identification of major annual and perennial weed species; the value of weeds as indicator plants (soil quality, characteristics, nutrient availability, dynamic nutrient accumulators)

Creating a diverse ecology: habitat diversity; creation, development and maintenance; beetle banks; environmental grants; relevant current legislation and codes of practice

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 assessment 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 review the history, philosophy and aims of the organic movement	M1 explain the factors that need to be considered when setting up an organic enterprise	D1 discuss regulation and inspection processes and issues which need to be addressed before setting up an organic growing business
P2 evaluate the roles of the Soil Association and other organisations within the organic movement		
P3 summarise systems related to organic production, biodynamics, agroforestry and permaculture		
P4 explain organic standards and certification		
P5 explain the concept of 'The living soil', including its physical, chemical and biological components		
P6 explain the causes of soil erosion and preventative measure that can be taken		
P7 review soil fertility and how it can be built up and maintained	M2 explain methods of developing and maintaining soil fertility for organic production	D2 explain the value of crop rotation and draw up and justify a rotation plan for a selected site.
P8 describe the process of conversion of a site to organic production		
P9 explain the growing methods for organic crops, including root, leafy, bulb and leguminous vegetables and soft and top fruits		

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 explain the sourcing of seeds and material inputs for organic systems		
P11 review the markets available for organic produce	M3 evaluate the marketing opportunities for organic produce in the UK	
P12 explain the management of marketing organic crops		
P13 summarise pest and disease management in organic systems	M4 explain the life cycle, preferred habitat and relevance to crop production of beneficial insects and predators.	
P14 review weed control strategies		
P15 explain the benefits and limitations of a diverse ecology and how this may be developed.		

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	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve practical assessments, written assessment, visits to suitable growers and will link to work experience placements.

Tutors delivering this unit have opportunities to use as wide a range of techniques as possible. Lectures, discussions, seminar presentations, farm and garden visits, supervised horticultural practice, research using the internet and/or library resources and the use of personal and/or industrial experience would all be suitable. Delivery should stimulate, motivate and educate learners.

Work placements should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities are undertaken, so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to work with professional organic growers and they should ask for observation records and/or witness statements to be provided as evidence of this. Guidance on the use of observation records and witness statements is provided on the Edexcel website.

Visiting expert speakers could add to the relevance of the subject for learners. For example, an inspector from one of the certification organisations or a member of a local growers' cooperative or the manager of an organic farm could talk about their work and the methods they use.

Whichever delivery methods are used, it is essential that tutors stress the importance of personal welfare, sound environmental management and the need to manage resources using legal methods.

Health and safety issues relating to working with horticultural tools and equipment must be stressed and reinforced regularly, and risk assessments must be undertaken before practical activities and before learners visit any sites. Adequate PPE must be provided and used following the production of suitable risk assessments. It is recommended that learners wear strong protective footwear with steel reinforced toecaps for all outdoor work.

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.

An organic system is founded on a coherent set of values and principles. Therefore, this should be understood and delivered from the outset, and be reflected in all aspects of the unit.

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 and its relevance to the industry.

Assignment 1: Principles of Organic Production (P1, P2, P4, M1, D1)

Tutor introduces the assignment brief.

Topic and suggested assignments/activities and/assessment

Learners review the history, aims, principles and standards of the organic movement and discuss the role of regulatory bodies.

Visits to organic growers.

Assignment 2: Maintaining Soil Fertility (P3, P5, P6, P7, P8, M2)

Tutor introduces the assignment brief.

Theory session: look at the importance of soil fertility within an organic growing system.

Practical sessions: learners investigate compost making and the use of manures, mulches and soil conservation techniques.

Assignment 3: Growing and Marketing (P9, P10, P11, P12, M3, D2)

Tutor introduces the assignment brief.

Methods used to grow crops organically.

Practical sessions: site preparation, sowing, planting, crop care, harvesting and marketing.

Learners evaluate marketing opportunities and economics for organic produce.

Assignment 4: Pest and Disease Management (P13, P14, P15, M4)

Tutor introduces the assignment brief.

Identify different methods of pest, disease and weed management for use within an organic growing system.

Learners to evaluate methods in practical sessions.

Unit review.

Assessment

For P1, P2, P3 and P4, learners must provide information on the philosophy and aims of the organic movement and the role of regulatory bodies in maintaining standards. Evidence could take the form of a pictorial presentation with notes, a PowerPoint presentation or a written report.

For P5, P6 and P7, learners must provide information on the importance of humus and the soil nutrient cycle in organic production. Learners could include examples of organically managed soils that they have observed in their evidence. Evidence could be in the same form as for P1.

For P8, learners should describe the process of converting a site to organic production. Evidence could be in the form of a pictorial presentation with notes or a PowerPoint presentation.

For P9 and P10, learners must provide information on potential growing methods and sources of appropriate seeds/plants, and materials for selected organic crops. Tutors should identify the crops or agree them through discussion with learners. Where possible, to ensure assessment is fair the size and complexity of the tasks should be the same for all learners. Evidence could be in the form of a report.

For P11 and P12, learners should review the markets available for organic produce and explain factors affecting the marketing of organic crops. Evidence could be in the form of a report.

For P13 and P14, learners must provide information on methods of pest, disease and weed management suitable for use in an organic growing system. Evidence could be in the same form as for P1.

For P15, learners must explain the benefits, and discuss possible limitations, of developing a diverse ecology in an organic growing system. Evidence could take the form of a pictorial presentation with notes, a PowerPoint presentation or a report.

For M1, learners must explain the factors that need to be considered when setting up an organic enterprise.

Evidence could be in the form of a pictorial presentation with notes or a PowerPoint presentation.

For M2, learners must explain methods of developing and maintaining soil fertility in organic production systems. They could include examples of methods that they have observed while studying this unit in their evidence. Evidence could be through tutor observations during practical activities and production of a report.

For M3, learners must evaluate the marketing opportunities for organic produce in the UK. Their evidence should be broad ranging and they may prefer to present this material as a series of short, real-life case studies based on local produce. Evidence could be in the same form as for P1.

For M4, learners must explain beneficial insects and predators, their life cycles, preferred habitat and relevance in crop pest and disease management. Learners should give examples of situations where these insects and predators may be of benefit to the grower. Evidence could be in the same form as for P1.

For D1, learners should discuss regulation and inspection processes and issues which need to be addressed before setting up an organic growing business. Evidence could be in the same form as for P1. Learners may wish to present this evidence in the form of a case study for a proposed business.

For D2, learners must explain the value of crop rotation and draw up and justify a rotation plan for a selected site. Tutors should identify the site or agree it through discussion with learners. Where possible, to ensure assessment is fair the size and complexity of the task should be the same for all learners. To emulate commercial practice it is expected that the rotation plan should cover a four-year period. Evidence could be in the same form as for P1.

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, P4, M1, D1	Principles of Organic Production	Review the history, aims, principles and standards of the organic movement and discuss the role of regulatory bodies. Visit local organic growers.	Pictorial presentation.
P3, P5, P6, P7, P8, M2	Maintaining Soil Fertility	Discuss the importance of soil fertility within an organic growing system. Practical sessions to demonstrate techniques.	Observations during practicals. Pictorial presentation.
P9, P10, P11, P12, M3, D2	Growing and Marketing	Practical sessions where learners grow and market a crop. Visit to organic produce supplier.	Observations during practicals. Written report. Pictorial presentation.
P13, P14, P15, M4	Pest and Disease Management	Evaluate different methods of pest, disease and weed management using learner's own site or visiting an organic producer.	Observations during practicals. Written report. Pictorial presentation.

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 3
Understand the Principles of Plant Science
Understand the Principles of Soil Science
Understand the Principles of Advanced Horticultural Science

Essential resources

Learners will need access to practical facilities which include an organically managed plot of land for practical work designed to include demonstration areas for practices such as composting, crop production, the making of liquid feeds and the growing of green manures.

Employer engagement and vocational contexts

This unit focuses on theoretical and practical aspects of organic crop production and will give learners background knowledge relating to a variety of skills and techniques. Centres are encouraged to create and develop links with local organic nurseries and suppliers. This could be via visits from growers and wholesalers or visits to commercial organic producers. When learning about the skills and techniques involved in organic growing, learners could be encouraged to gain work experience with a local producer or supplier.

Indicative reading for learners

Textbooks

Bevan J – *Organic Apple Production: Pest and Disease Management* (HDRA, 2001) ISBN 090534331X

Blake F – *Organic Farming and Growing: A Guide to Management, 3rd Edition* (The Crowood Press, 1994) ISBN 978-1852238384

Brenman S – *Organic Food and Farming Report* (Soil Association, 1999) ISBN 978-0905200736

Buczacki S and Harris K – *Pests, Diseases and Disorders of Garden Plants, 3rd Edition* (HarperCollins, 2005) ISBN 0007196822

Davies G and Lennartsson M – *Organic Vegetable Production: A Complete Guide* (The Crowood Press, 2006) ISBN 978-1861267887

Kruger A – *HDRA: Encyclopaedia of Organic Gardening* (Dorling Kindersley, 2005) ISBN 978-1405308915

Lampkin N – *Organic Farming, 2nd Edition* (Old Pond Publishing, 2002) ISBN 978-1903366295

McCoy S and Parlevliet G – *Organic Production Systems Guidelines: Beef, Wheat, Grapes and Wines, Oranges, Carrots* (Rural Industries Research & Development Corporation, 2001) ISBN 0642582203

Mollison B and Slay R – *Introduction to Permaculture, 2nd Edition* (Tagari Publications, 1994) ISBN 0908228082

Myers A – *Organic Futures: The Case for Organic Farming* (Green Books, 2005) ISBN 978-1903998694

National Institute of Agricultural Botany – *NIAB Organic Vegetable Handbook* (NIAB, 1998) ISBN 0948851120

Journals

Organic Farming

Organic Gardening

The Organic Way (magazine of Garden Organic – formerly the HDRA)

New Scientist

The Ecologist

The Grower

The Living Earth

Websites

www.biodynamic.org.uk

www.cat.org.uk/information

www.compost.org.uk

www.defra.gov.uk

www.efrc.com

www.environment-agency.gov.uk

www.gardenorganic.org.uk

www.hse.gov.uk

www.lantra.co.uk

www.newfarm.org

www.rhs.org.uk

www.soilassociation.org

Biodynamic Agricultural Association

The Centre for Alternative Technology

The Composting Association

Department for Environment, Food and Rural Affairs

Elm Farm Research Centre

Environment Agency

Garden Organic

Health and Safety Executive

Lantra Sector Skills Council

The New Farm

The Royal Horticultural Society

Soil Association

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	researching background information on techniques and applying them to their practical work
Creative thinkers	using results from observations of the crop to review its performance and suggest improvements
Reflective learners	applying information obtained through research and using it in practical sessions
Team workers	reviewing work with others
Self-managers	organising resources required for organic crop production
Effective participators	discussing options with their tutor for dealing with crop problems.

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 cropping techniques using a variety of sources of information
Reflective learners	analysing the performance of the production method and suggesting improvements
Self-managers	monitoring and caring for the crop.

● 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 the internet to research appropriate information on organic crop production methods
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. 	producing written assessments using ICT programmes
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	delivering PowerPoint presentations on various topics
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	evaluating success of a particular production method by calculating yield
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 their report on the growing and marketing of organic crops
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	completing a written report on maintaining soil fertility in an organic cropping system.