



## **National Unit specification: general information**

**Unit title:** Soils and Growing Media in Horticulture

**Unit code:** H1JA 11

**Superclass:** SL

**Publication date:** May 2012

**Source:** Scottish Qualifications Authority

**Version:** 01

### **Summary**

Candidates who achieve this Unit will have a greater understanding of the processes that formed natural soils over a period of time and the development of growing media and ameliorants that can be used in horticulture. Candidates will be able to identify the properties of a soil that make them suitable or unsuitable for use in horticulture by completing a textural analysis. Candidates will be able to correctly identify a range of soil structures and appreciate what constitutes a fertile soil. Candidates will be able to explain the components of a growing medium suitable for use in the horticulture industry. Candidates will also appreciate the range of growing medium ameliorants and suitable substitute materials that have developed over recent years.

The Unit is designed for candidates wishing to develop their knowledge of soils who are starting a career in the horticulture industry.

### **Outcomes**

- 1 Describe the processes that influence soil formation.
- 2 Describe the characteristics of a range of natural soils.
- 3 Describe a range of growing media and ameliorants used in the horticulture industry.

### **Recommended entry**

Entry is at the discretion of the centre.

## **General information (cont)**

**Unit title:** Soils and Growing Media in Horticulture

### **Credit points and level**

1 credit at SCQF level 5: (6 SCQF credit points at SCQF level 5\*)

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

### **Core Skills**

There is no automatic certification of Core Skills or Core Skill components in this Unit.

## **National Unit specification: statement of standards**

### **Unit title: Soils and Growing Media in Horticulture**

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

#### **Outcome 1**

Describe the processes that influence soil formation.

##### **Performance Criteria**

- (a) Describe correctly the soil formation processes in relation to the effects of topography, climate and time on the parent rock material.
- (b) Describe correctly the effects of plants, animals and humans on soil formation processes.

#### **Outcome 2**

Describe the characteristics of a range of natural soils.

##### **Performance Criteria**

- (a) Identify accurately the texture of a range of known soil types.
- (b) Describe correctly the structure and profile of a range of soils.
- (c) Describe correctly the factors that influence soil fertility.
- (d) Describe correctly the major components of a typical soil.

#### **Outcome 3**

Describe a range of growing media and ameliorants used in the horticulture industry.

##### **Performance Criteria**

- (a) Describe what is meant by the term growing medium, soil ameliorants and compost and the differences between each one.
- (b) Describe accurately the range of soil ameliorants that can be used when developing growing media, including: peat, perlites, coir, bark and recycled materials.
- (c) Describe correctly how the use of different materials will affect different growing situations, root development, drainage and suitability when mixing different growing media.

## **National Unit specification: statement of standards (cont)**

**Unit title:** Soils and Growing Media in Horticulture

### **Evidence Requirements for this Unit**

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

#### **Outcome 1 — Written and/or recorded oral evidence.**

The candidate must describe the formation of soils to the standard specified in the Performance Criteria (a) and (b).

The evidence for this Outcome is written and/or recorded oral evidence assessed through an open-book exercise.

#### **Outcome 2 — Written and/or oral evidence and performance evidence**

For performance Criterion (a) the candidate must, through a checklist:

- ◆ Provide evidence of the textural type of four different soils by tactile analysis
- ◆ State the characteristics that enabled correct identification.

For performance criterion (b), (c) and (d) the candidate must complete a multiple choice assessment, which covers a minimum of three questions on the following areas:

- ◆ Soil Structure
- ◆ Soil Texture
- ◆ Soil Profiles
- ◆ Soils Fertility
- ◆ Major Soil Components

#### **Outcome 3 — Written and/or oral evidence and performance evidence**

The candidate is required to complete a short answer response which covers a minimum of one question from each of the following areas:

- ◆ Soil Ameliorants/Substitutes
- ◆ Compost mixes for different growing situations
- ◆ The effects of soils and growing media on drainage, root development, fertility and stability.

## **National Unit specification: support notes**

### **Unit title:** Soils and Growing Media in Horticulture

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

### **Guidance on the content and context for this Unit**

This is a mandatory Unit for the National Certificate in Horticulture, but can also be taken as a free standing Unit.

The Unit is aligned to the following Lantra, Sector Skills Council's National Occupational Standard (NOS) Units:

(L2) Establish Plants Outdoors  
(CU74) Prepare Growing Media  
(CU2) Monitor and Maintain Health and Safety

It is important to recognise the term soil relates to the 'in-situ' materials that support the growth of plants to avoid confusion with the widening range of prepared growing media, soil ameliorants and soil substitute materials.

#### **Outcome 1**

The relevance of parent rock material to the nature and properties of soils requires a very brief introduction to rock types and the effects of environmental factors on them. Since Scotland has been heavily glaciated, the importance of the action of ice and the deposits left behind by retreating glaciers as the parent material for soil forming processes should be considered.

Other effects of topography, a rolling surface will increase removal of water and increase erosion therefore reducing the development of deep soils. Climate conditions such as temperature and precipitation influence chemical and physical processes. The effect of time rocks are subjected to weathering should be considered.

The ability of trees to take root in rock crevices and become instrumental in rock-splitting should be considered. Other effects of micro-organisms, plants, invertebrates and vertebrates, including man, on soil formation and change should be included. Additional local information should be considered, where appropriate.

## National Unit specification: support notes (cont)

### Unit title: Soils and Growing Media in Horticulture

#### Outcome 2

For Performance Criteria (b), (c) and (d) the candidate could complete a multiple choice assessment, which covers a minimum of three questions on the following areas:

- ◆ Soil texture
- ◆ Soil structure
- ◆ Soil profiles
- ◆ Soil fertility
- ◆ Major soil components

Candidates should be able to determine the soil texture categories of sands, silts and clays. Although a tactile method of texture determination is adequate for this Unit, candidates should be aware of other quantitative methods using, for example, soil sieves. Candidates should also understand the relationship of pH on a soil and be able to demonstrate that they can complete an accurate simple pH test on a given soil using a range of testing apparatus.

Reference should be made to the following soil structures; crumb, granular, blocky and platy. It may be possible to observe different soil structure through a range of soil profiles. Profile pits can be created to examine natural soils. Soil horizons can be recorded to determine soil type and structure.

Factors affecting soil fertility should include water holding capacity (and related characteristics such as potential for water-logging, ease of cultivation, soil temperature, etc.), pH and mineral nutrient levels.

The nature and function of inorganic material, organic matter, air, water and living organisms should be covered. Living organisms should include: algae, fungi and bacteria.

#### Outcome 3

Candidates should be able to understand what is meant by the term growing medium as the material used in a container to grow a plant and what understand what the requirements are of a growing medium in order to raise plants successfully. Candidates should also understand what is meant by a soil improver/amendment as materials that are added to soils/ growing media to improve their physical and/or chemical characteristics and identify a range of materials that can be used and the effects of each. Candidates should also understand the meaning of the word 'compost' as a product of a composting operation (eg the compost heap at the bottom of the garden) and may be a component of a growing medium. Candidates should understand that peat is not a product of composting.

Performance Criterion (b) expands on Performance Criterion (a) by developing knowledge of the many different materials that can be used as an amendment to make a growing medium. The difference between both, inorganic ameliorants (eg rockwool, perlite), or organic ameliorants (such as peat, bark) should be understood by candidates. Both the advantages and disadvantages of each material used should be understood by candidates.

Local sourcing, availability and sustainability should be discussed as different parts of the world have developed ameliorants based on local availability of various raw materials.

## **National Unit specification: support notes (cont)**

### **Unit title:     Soils and Growing Media in Horticulture**

Performance Criterion (c) candidates should understand the effects of blending different materials together in order to achieve the correct balance of air and water holding capacity for plants being grown in different situations. The effect on nutrition, root development and pests and diseases should be discussed when selecting and preparing growing medium ameliorants.

### **Guidance on learning and teaching approaches for this Unit**

Classroom activity should be used to introduce soil formation (Outcome 1). Candidates can develop their knowledge by group activities by researching through ICT media and investigating library text books. This Outcome should be taught in the early stages of the Unit so that adequate time can be allocated. Milestones can be set for the completion of the report. It may well be that there is evidence of soil formation within distance of a visit from the centre such as glacial erosion. The use of National Soil maps can also help to illustrate the difference and range of soil deposits in any area of the UK.

Outcome 2 can be delivered through practical demonstrations of textural analysis by sedimentation using the principles of Stokes Law, placing samples of a soil in a 500ml measuring tube which will provide evidence of different soil materials. Samples of different soil structure collected over a period of time will assist in demonstrating the different soil structures. Natural soil profiles can be obtained or purchased to show a range relevant to the areas of Scotland.

Outcome 3 should be delivered after candidates appreciate the natural materials that make up our soils. It is then possible to understand why these natural materials have to be mixed or modified to create a suitable growing medium. Visits to relevant soil mixing and commercial compost/growing medium retailers/producers covering a range of different growing media will greatly enhance the delivery of the Unit. The use of visiting speakers who have experience of working on facilities using soil ameliorants or substitute materials will be useful for the candidates. These may include commercial soil management sites, compost development sites and areas using natural soil media as examples.

### **Guidance on approaches to assessment for this Unit**

For Outcome 1 candidates could produce an integral assessment in the form of a portfolio or project covering all the Performance Criteria in the Outcome. This assessment should be given at an early stage of the Unit so that time can be planned for individual consultation with candidates. Where evidence is generated orally an assessor checklist and/or recording of the information should be completed. Candidates who do not submit a report to the required standard must be provided with adequate feedback before they attempt a re-assessment.

A multiple choice question paper for Outcome 2 could be set and also use a suitable programme using ICT. There should be at least two alternative papers for use in re-assessment.

For Outcome 3 assessment can either be considered as a complete a short answer response question paper or produce a portfolio of evidence in the form of a project that identifies understanding of the Performance Criteria measured against a checklist.

## **National Unit specification: support notes (cont)**

**Unit title:** Soils and Growing Media in Horticulture

### **Opportunities for the use of e-assessment**

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

### **Opportunities for developing Core Skills**

There is no automatic certification of Core Skills or Core Skills components in this Unit, however there may be opportunities to develop the Core Skills of *Communication, Numeracy, Information and Communication Technology (ICT), Problem Solving and Working with Others* at SCQF Level 4.

### **Disabled candidates and/or those with additional support needs**

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements)



## History of changes to Unit

Version	Description of change	Date

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