National Unit specification: general information

Unit title: Soils and Plant Growth (SCQF level 4)

Unit code: H1TP 10

Superclass: RF

Publication date: October 2012

Source: Scottish Qualifications Authority

Version: 02

Summary

The purpose of this Unit is to provide candidates with the knowledge and skills to: identify soil types; understand the conditions provided by soils for healthy plant growth including nutrition; be aware of the need for soil improvement and for the nutritional supplementation of plants in cultivated/managed situations and be aware of how this might be achieved. This Unit is aimed at candidates with little or no experience of soils or plant growth. It is part of the National Certificate in Greenkeeping and Horticulture at SCQF level 4, but can also be taken as a free standing Unit.

Outcomes

1 Analyse a range of soil types and record results.
2 Identify the basic conditions for successful plant growth.
3 Assist with soil improvement and nutritional supplementation.

Recommended entry

Entry is at the discretion of the centre. Candidates undertaking this Unit require no prior knowledge or experience in horticulture or greenkeeping, however an interest in outdoor practical work and the subject would be an advantage.

Credit points and level

1 National Unit credit at SCQF level 4: (6 SCQF credit points at SCQF level 4)

**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.*

General information (cont)

Unit title: Soils and Plant Growth

Core Skills

Achievement of this Unit gives automatic certification of the following Core Skills component:

Complete Core Skill None

Core Skill component Critical Thinking at SCQF level 4

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of this Unit specification.

National Unit specification: statement of standards

Unit title: Soils and Plant Growth

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

Analyse a range of soil types and record results.

Performance Criteria

(a) Identify common soil types.
(b) Collect and analyse soil types.
(c) Record results.

Outcome 2

Identify the basic conditions for successful plant growth.

Performance Criteria

(a) Identify the important nutrients provided by soils.
(b) Describe the importance of soil air and water for plant growth.
(c) Describe the importance of organic matter in the soil.

Outcome 3

Assist with soil improvement and nutritional supplementation.

Performance Criteria

(a) Describe health and safety requirements for handling nutritional supplements.
(b) Select tools and equipment for the activity.
(c) Assist with soil improvement.
(d) Assist with nutrient supplementation.

National Unit specification: statement of standards (cont)

Unit title: Soils and Plant Growth

Evidence Requirements for this Unit

All relevant operational procedures undertaken in this Unit must adhere to current legislation and regulations; codes of practice and manufacturers recommendations where appropriate.

In relation to Outcome 1 — To demonstrate an understanding of soil types and soil analysis, evidence should be supported by a written and/or oral closed-book assessment identifying soil types covering PC (a) and an open-book supervised written and/or oral assessment covering PCs (b)–(c).

Evidence to include:

- correct identification of three soil types from examples provided
- correct analysis of soil including sand silt and clay and soil characteristics
- a record of findings

In relation to Outcome 2 — To demonstrate an understanding of the most commonly supplemented soil nutrients and the importance of soil air, water and organic matter, evidence must be supported by a written and/or oral closed-book assessment covering PCs (a)–(c).

Evidence to include:

- the identification of Nitrogen, Phosphorous and Potassium as the most commonly supplemented soil nutrients
- an accurate description of the importance of soil air, water and organic matter for plant growth

Outcome 3 — Written and/or oral closed-book evidence for PC (a) and performance evidence, supported by an observation checklist covering PCs (b) and (c).

- An accurate description of current health and safety regulations for handling nutritional supplements, which includes the use of PPE
- Assist with soil improvement including the following tasks:
  - Selection of correct tools/equipment; application or incorporation of organic materials, at the correct rate, using appropriate cultivation techniques or mulching
- Assist with nutrient supplementation including the following tasks:
  - Selection of correct tools/equipment; application of fertiliser at the correct rate as a base dressing, top dressing or liquid feed to the soil or a crop; or the application of turf dressings

National Unit specification: support notes

Unit title: Soils and Plant Growth

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 Unit is aligned to the following LANTRA National Occupational Standards (NOS):

CU61 Assist with planting and establishing plants
CU62 Assist with maintaining plants
CU63 Assist with the vegetative propagation of plants
CU64 Assist with the propagation of plants from seed
CU71 Assist with the preparation of growing media

It is intended as an introduction to the identification and make up of soils, the role of soil in plant growth and the importance of both maintaining the soils condition and providing supplementary plant nutrition.

Outcome 1 — looks at the identification and simple analysis of soils. The soils chosen for identification should have obvious and easily distinguishable characteristics making them easy to tell apart. The collection and analysis of soil samples gives the opportunity for field work and the observation of soil type's in-situ. Note that the physical collection of the samples is not assessable. The analysis introduces the candidate to the idea of differing proportions of sand, silt and clay in soil, and how these influence a soil's physical characteristics. The origins of these materials could be discussed at this stage and the presence, purpose and origins of organic matter in the soil could be mentioned as a lead in to Outcome 2.

Outcome 2 — helps the candidate identify the major nutrients provided by the soil. The role of these nutrients in plant growth could be introduced in a basic way. It is suggested that at this level the nutrients should be restricted to Nitrogen (N), Phosphorous(P) and Potassium (K); those most commonly supplemented by fertiliser application.

The concept of soil pore spaces could be introduced to the candidates and the reasons for the changing balance of air/water within them discussed. The importance of soil organic matter should be highlighted both in terms of soil structure and the provision of recycled nutrients at the end of the decompositional process.

Outcome 3 — involves the candidate in practical tasks; applying/incorporating appropriate organic material as a means of maintaining the soil structure. This could involve the application and incorporation of organic matter as part of a cultivation exercise; but mulching would also be appropriate.

Fertiliser application could take the form of base dressings or top dressing to the soil or a crop, liquid feeding or the application of turf dressings.

Appropriate application rates should be discussed with the candidates prior to carrying out the activities.

Guidance on learning and teaching approaches for this Unit

The order in which Outcomes 1 and 2 are taught is interchangeable; although the published running order for these is probably best. It is suggested that Outcome 3 be taught last.

Outcome 1 — Classroom activities could be used to outline the fact that soil types may differ between sites; to outline some of the main soil types found in the local area and to explore their characteristics. Samples may be useful as an introduction and candidate centred research on the internet could be introduced. The sample gathering exercise provides an opportunity to observe soils in situ and these samples could be used for both the identification exercise and the analysis exercise. The analysis may be carried out using textural hand analysis. In addition drying and sieving or the settlement velocity method in a water column may be introduced as a more direct and visual way of comparing the proportions of sand, silt and clay in the samples and relating these to soil characteristics.

Outcome 2 — This Outcome may also be delivered in a classroom, where nutrients and their functions in the plant are discussed. Hand-outs, the internet and examples of common fertilisers including their packaging and nutrient analysis could all be discussed. The importance of soil, air and water in the soil pore spaces could be illustrated using diagrams and soil samples. The importance of soil organic matter, its origins and functions in the soil could be discussed with examples of a range of common organic materials used in soil improvement.

Outcome 3 — Both PCs in this Outcome require the candidates to assist with practical tasks and should be conducted as outdoor practical sessions with appropriate discussion, explanation and demonstration before the candidates begin. Appropriate PPE will be worn and all appropriate Health and Safety related legislation and guidelines adhered to.

Guidance on approaches to assessment for this Unit

For Outcome 1 (a) the candidate must correctly identify a minimum of three distinct soil types. These should be available as samples to the candidates with either oral or written evidence acceptable and recorded on a checklist. The candidate must also correctly record answers to questions on issues relating to soil analysis and the findings of the soil analysis including sand silt and clay and soil characteristics.

Outcome 2 is assessed by means of questions, or similar activity, covering points in all three PCs with either written or oral evidence provided.

Outcome 3 is assessed by means of a written or oral question, or similar activity, for PC (a); and three practical tasks, one for each of the PCs (b), (c) and (d). The stages in each task could be listed on an observation checklist which is completed by the assessor as evidence. Candidates must be aware of appropriate application rates for both fertilisers and organic materials.

National Unit specification: support notes (cont)

Unit title: Soils and Plant Growth

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 e-checklists. 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

The learning and teaching activities employed in this Unit could provide opportunities for the development of skills in *Communication, Numeracy* and *Problem Solving* at SCQF level 4.

The specific tasks providing clear opportunities for development include soil analysis and the concept of proportions and the application of fertiliser at the correct rate (quantity). Discussion of various topics and the provision of oral or written answers; listening to instructions and following them and solving the practical problems associated with manual work.

This Unit has the Critical Thinking component of Problem Solving embedded in it. This means that when candidates achieve the Unit, their Core Skills profile will also be updated to show they have achieved Critical Thinking 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**

History of changes to Unit

Version	Description of change	Date
02	Core Skills Component Critical Thinking at SCQF level 4 embedded.	09/10/2012