Higher National Unit specification

General information for centres

Unit title: Advanced Plant Propagation

Unit code: F1J2 35

Unit purpose: This Unit aims to develop candidate knowledge and understanding of the propagation of plants by seed, cuttings and grafting. The Unit is relevant to the commercial production of plants and also for the conservation of plant material, for example in botanic gardens. Candidates will be made aware of the importance of the initial propagation material and how to ensure its quality. Candidates will gain an understanding how to propagate difficult species from seed, cuttings and graftage so that the principles can be applied in practice to a wide range of plants.

On completion of the Unit the candidate should be able to:

1 Describe how quality propagation material can be produced and assessed.
2 Evaluate the requirements for successful seed germination.
3 Explain the requirements for rooting cuttings from a range of species.
4 Explain how a range of species can be successfully grafted.

Credit points and level: 1 HN credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Candidates should have prior practical experience in plant propagation. This may be through practical propagation experience on a nursery or similar or by having completed Units such as F1JA 34 *'Horticultural Practices'*, F21T 34 *'Plant Growth and Development'* or F1MS 34 *'Plant Physiology'*.

Core Skills: There may be opportunities to develop the Core Skills of Problems Solving and Numeracy at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: A sequential approach to assessment should be undertaken with Outcome 1 being undertaken first. A supervised, closed-book assessment should be undertaken for this Outcome. The sequence of assessment for Outcomes 2 to 4 is not critical and these Outcomes could be assessed by either written reports or written or oral assessment.

Higher National Unit specification: statement of standards

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe how quality propagation material can be produced and assessed

Knowledge and/or Skills

- Seed quality standards
- Quality of vegetative material
- Methods of assessing seed quality
- Methods of ensuring quality in propagated material

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- describe the quality in seed and plant material for vegetative propagation
- describe methods of assessing quality of propagation material and how quality of propagation material is achieved

Assessment Guidelines

An assignment in a supervised situation should be used to show that candidates could describe examples of the following:

- how seed for commercial horticulture production is produced and how it could be assessed for quality
- how vegetative propagation material is assessed for quality and could be produced to the required quality
- how vegetative plants can be managed to produce the correct type of propagation material

Higher National Unit specification: statement of standards (cont)

Unit title: Advanced Plant Propagation

Outcome 2

Evaluate the requirements for successful seed germination

Knowledge and/or Skills

- Treatments for breaking dormancy
- Treatments to improve establishment
- Environmental requirements for germination
- Establishment of optimal plant populations

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- evaluate seed pre-treatments
- evaluate germination environment
- explain how to establish the optimal plant populations in seed raised crops

Assessment Guidelines

A report should be used to show that candidates could describe examples of the following:

- evaluate how one seed pre-treatment could be used to improve crop establishment
- identify the optimum environment for germination for two different species
- calculate the seed rate required to achieve a required plant population
- explain how problems like damping off can be reduced

Alternative Assessment:

Assessment could include a practical project on seed germination supported by a report or an assignment with structured questions.

Outcome 3

Explain the requirements for rooting cuttings from a range of species

Knowledge and/or Skills

- Timing of types of stem and root cuttings
- Selection of appropriate propagation material
- Environmental condition for rooting cuttings
- Maintenance of quality during rooting

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can justify and use suitable propagation methods for a range of at least four species that require at least three different types of stem cuttings.

Assessment Guidelines

This Outcome could be assessed by a written report by investigating the propagation from stem cuttings of 4 different species. Each candidate should have a different group of plants and these should require different types of stem cuttings; for example leafless winter cuttings requiring base heat or no base heat, softwood or semi-ripe leafy cuttings, stem, tip or basal cuttings. Candidates should produce a 'blue-print' for the propagation of each species and an explanation of why the method selected is to be used.

Outcome 4

Explain how a range of species can be successfully grafted

Knowledge and/or Skills

- Uses of graftage in horticulture
- Requirements for successful graftage
- Selection of graftage methods depending on species or market
- Care after grafting to ensure success

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can plan the grafting of at least two different species.

Assessment Guidelines

This Outcome could be assessed by a written report based on a case study to investigate the grafting of two different species. Each candidate should have different plants and these should require different types of grafting; for example T-budding, chip budding, splice graft, side veneer graft. Candidates should produce a 'blue-print' for the grafting and after-care of each species and a brief explanation of why the method selected is to be used.

Administrative Information

Unit code: F1J2 35

Unit title: Advanced Plant Propagation

Superclass category: SD

Original date of publication: March 2007

Version: 01

History of changes:

Version	Description of change	Date

Source: SQA

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

Higher National Unit specification: support notes

Unit title: Advanced Plant Propagation

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 aims at providing the candidate with a greater scientific understanding of the principles of plant propagation to enable the candidate to select appropriate propagation techniques for species with which they may be unfamiliar. Candidates require to have previous practical propagation experience either in work or a college environment. The Unit is principally aimed at the methods employed in commercial horticulture but will be relevant to propagators working in botanic gardens or similar establishments where propagation is required to maintain plant collections.

Outcome 1 will investigate how propagation material of suitable quality is produced and assessed. Candidates will be introduced into how seed is produced for different sectors of the horticulture industry, for example seed for bedding plants or seed orchards for ornamental trees. The assessment of quality; germination potential, viability, purity and vigour, will be discussed and the role of certification explained. Similarly the provision of quality material for vegetative propagation will be covered with particular emphasis on formal government supervised certification schemes for the likes of fruit crops, how quality of annual ornamentals produced from cuttings are ensured and approaches used for the provision of quality woody material produced vegetatively. In addition the management of stock plants, especially woody plants to produce suitable propagation material will be discussed.

Outcome 2 looks at managing seed germination to achieve even stands of quality seedlings. Pre-germination treatments will look at techniques for breaking dormancy in seed where required prior to sowing as well as other treatments to improve even germination like seed priming. The environmental requirements for seed germination that will be investigated to enable candidates to understand how this varies for different species often based on its ecology. The calculation of seed rates to achieve the correct plant populations will be described with reference to seed and seedbed quality.

Outcome 3 will cover the principles of rooting evergreen and deciduous leafy stem cuttings of woody material and leafless winter cuttings. The importance of timing of cuttings, with particular reference to the growth of the selected cuttings will be investigated. The environmental requirement to root cuttings and the principle of maintaining the correct turgor within leafy cuttings will be taught along with the practical systems available to achieve the environment. Leafless cuttings will also be discussed and the main methods that can be used to root this type of cutting.

Outcome 4 looks at the uses of graftage in horticulture, the principles of what is required to achieve a successful take during grafting and the main methods used in commercial horticulture and the reason for using different types of graftage.

Initial reference material recommended for this Unit is:

- *'Plant Propagation: Principles and Practice'*, Hartmann H T, Kester D E, Davies F T, Geneve R L. Edition 6 or later
- *'Practical Woody Plant Propagation for Nursery Growers'*, Macdonald B
- *'The International Plant Propagators Proceedings'*
- Research Papers written by Keith Loach in the 1970's and 1980's on rooting leafy cuttings
- Research Papers from East Malling Research Station on leafless winter cuttings and leafy stem cuttings

Guidance on the delivery and assessment of this Unit

It is recommended that this Unit be taught through a series of lectures, which could be supplemented by practical classes. Practical classes could include visits to nurseries. Alternatively, these could be in the form of talks by propagators.

Suitable approaches to generating evidence may include supplementing a student-centred written assignment with an oral explanation by the candidate.

Opportunities for developing Core Skills

There may be opportunities to develop the Core Skill of Problem Solving and Numeracy at SCQF level 6, although there is no automatic certification of Core Skills or Core Skills components.

Open learning

Elements of this Unit could be delivered by distance or flexible learning. Although it would be beneficial for the candidate to attend the centre for supervised assessment, this could be done in off-centre locations with appropriate arrangement.

For information on open learning arrangements please refer to the SQA guide *Assessment and Quality Assurance for Open and Distance Learning* (SQA, 2000).

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* **(www.sqa.org.uk)**.

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