



Higher National Unit specification

General information

Unit title: Advanced Plant Propagation (SCQF level 8)

Unit code: H7B5 35

Superclass: SD

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Version: 01

Unit purpose

This Unit aims to develop the learner's knowledge and understanding of the propagation of plants by seed, cuttings and grafting. The Unit is relevant to the commercial production of plants, propagation of plants by professional gardeners and also for the conservation of plant material, for example in botanic gardens. Learners will be made aware of the importance of the initial propagation material and how to ensure its quality. Learners 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.

Outcomes

On successful completion of the Unit the learner will be able to:

- 1 Explain how quality propagation material is produced and assessed.
- 2 Explain the requirements for successful seed germination.
- 3 Explain the requirements for rooting cuttings.
- 4 Explain how grafting can be successfully achieved.

Credit points and level

1 Higher National Unit credit at SCQF level 8: (8 SCQF credit points at SCQF level 8)

Recommended entry to the Unit

Learners would benefit from having 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 *Horticultural Practices F1JA 34*, *Plant Growth and Development F21T 34* or *Plant Physiology F1MS 34*.

Higher National Unit Specification: General information (cont)

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Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes for this Unit specification.

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

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.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Higher National Unit specification: Statement of standards

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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.

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. Learners 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

Explain how quality propagation material is 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

Outcome 2

Explain 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
- ◆ Appropriate technique(s) for a range of species

Outcome 3

Explain the requirements for rooting cuttings.

Knowledge and/or Skills

- ◆ Types of cuttings and when they are used
- ◆ Selection of appropriate propagation material
- ◆ Environmental condition for rooting cuttings
- ◆ Maintenance of quality during rooting
- ◆ Appropriate technique(s) for a range of species

Higher National Unit specification: Statement of standards (cont)

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Outcome 4

Explain how grafting can be successfully achieved.

Knowledge and/or Skills

- ◆ Uses of graftage in horticulture
- ◆ Requirements for successful graftage
- ◆ Selection of graftage methods
- ◆ Care after grafting to ensure success
- ◆ Select appropriate technique(s) for a range of species

Evidence Requirements for this Unit

Learners will need to provide evidence to demonstrate their Knowledge and/or skills across all Outcomes by showing that they can:

Produce a propagation plan that could be implemented for a range of species. This would include using seed, method(s) of cuttings, method(s) of grafting and micro-propagation. In addition the learners will justify their plan by explaining the reasons for their choices compared to other possible propagation methods and that they can outline the scientific principles behind the techniques used.

The plan should cover a minimum of:

- ◆ 2 examples of propagation by seed
- ◆ 2 examples of propagation by cuttings
- ◆ 2 examples of propagation by grafting
- ◆ 1 example of micro-propagation

A detailed propagation plan should be developed by the learners that contains enough detail that a propagator could take the information and use it in a practical situation. This would include:

- ◆ How to obtain the propagation material of the correct quality.
- ◆ Seed pre-treatments appropriate to species, sowing conditions to be provided.
- ◆ Type(s) of cutting to be used, timing, preparation of cutting, rooting environment to be provided.
- ◆ Type(s) of graft to be used, rootstock/scion selection, preparation prior to grafting, grafting process and aftercare.
- ◆ The justification of the methods selection and a brief explanation of the scientific principles behind the techniques could be included with the plan or assessed by a separate extended response assessment.



Higher National Unit Support Notes

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Unit Support Notes are offered as guidance and 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 learner with a greater scientific understanding of the principles of plant propagation to enable the learner to select appropriate propagation techniques for species with which they may be unfamiliar. Learners 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. Learners will be introduced to 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 will be investigated to enable learners 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 along with the reason for using different types of graftage.

Higher National Unit Support Notes (cont)

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Guidance on approaches to delivery of this Unit

It is recommended that this Unit be taught through a series of lectures. The order that the Outcomes are taught is not critical. The provision of quality propagation material could be taught as part of the individual propagation methods or as a stand alone topic. Tutorials could be held to provide feedback on methods selected by students from their own research. Practical classes of relevant propagation techniques not previously undertaken by learners would be valuable. Visits to nurseries and gardens to see different techniques in practice and speak with propagators would be beneficial to help learners produce a practical propagation plan. Learners could work together to research and develop their plans.

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

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

All Outcomes together — holistic assessment of the Unit. The production of a propagation plan covering all Outcomes will be a realistic exercise. Learners could select species that they have an interest in or be provided with species to research. Several species should be investigated, ie more than 6.

The learner must demonstrate that they can select appropriate techniques for a range of plants. This must be more than 6 species. The number of species is not critical as long as it will produce a plan covering seed, cutting, grafting and micropropagation. This could be provided by a written report for the species or by an oral presentation. Evidence of an understanding of the principles behind the propagation techniques used could be provided as part of an assignment report or as a separate written assessment of extended response questions.

The Outcomes can be assessed across the whole Unit by preparing a report about the propagation of the plants selected, ensuring that each of seed, cuttings, grafting and micropropagation are appropriate to at least one of the species in the report.

Where more than one technique is possible to use, for example different types of cuttings or grafting, then not every technique needs to be included by the learner. However reasons for selecting one method over possible others would be required to be provided.

Learners may work in groups or individually to research the propagation of the range of plants. Each learner would have a different selection of species for their assessment and so would need to apply information obtained to their particular situation. Oral presentations could also be used to ensure a learners understanding of the selected propagation methods and their justification.

Higher National Unit Support Notes (cont)

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Opportunities for 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 learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

Opportunities for developing Core and other essential 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.

History of changes to Unit

Version	Description of change	Date

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General information for learners

Unit title: Advanced Plant Propagation (SCQF level 8)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This Unit aims at providing the learner with a greater scientific understanding of the principles of plant propagation to enable the learner to select appropriate propagation techniques for species with which they may be unfamiliar. Learners require to have previous practical propagation experience either in work or a college environment. The Unit is principally aimed at the most common 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. Learners 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, for example, seed priming. The environmental requirements for seed germination will be investigated to enable learners 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 cuttings, principally of evergreen and deciduous leafy stem cuttings of woody material and leafless winter cuttings. Root and leaf cuttings will also be discussed. 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. The principle methods used in commercial horticulture will be discussed along with the reasons for their selection.