



R2104

UNDERSTANDING PLANT PROPAGATION

Level 2

Monday 11 February 2019

14:50 – 15:40

Written Examination

Candidate Number:

Candidate Name:

Centre Number/Name:

IMPORTANT – Please read carefully before commencing:

- i) The duration of this paper is **50** minutes;
- ii) **ALL** questions should be attempted;
- iii) **EACH** question carries **10 marks**;
- iv) Write your answers legibly in the lined space provided. It is **NOT** necessary that all lined space is used in answering the questions;
- v) Use **METRIC** measurements only;
- vi) Use black or blue ink only. Pencil can be used for drawing purposes only;
- vii) Where plant names are required, they should include genus, species and where appropriate, cultivar;
- viii) Where a question requires a specific number of answers; only the first answers given that meet the question requirement will be accepted, regardless of the number of answers offered;
- ix) Please note, when the word '**distinct**' is used within a question, it means that the items have different characteristics or features.

Ofqual Unit Code D/505/2965

Please turn over/.....

ANSWER ALL QUESTIONS

MARKS

Q1 a) Name **ONE** example of a plant with **EACH** of the following types of seed by completing the table below:

Type of seed	Name of plant
Orthodox (dry) vegetable	
Orthodox (dry) flower	
Recalcitrant (moist)	

1

1

1

b) Describe the method of storage for orthodox (dry) seeds.

2

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.....

.....

c) Describe the preparation of a **NAMED** fleshy fruit for seed storage under **EACH** of the following headings:

- i) harvesting;
- ii) maceration;
- iii) separation.

1

2

1

NAMED fleshy fruit

1

i).....

ii).....

iii).....

Total Mark

Please see over/.....

MARKS

Q3 a) State what is meant by the term vegetative propagation.

2

.....
.....
.....

b) List **FOUR** distinct artificial methods of vegetative propagation, giving a **NAMED** plant example for **EACH** by completing the table below:

Artificial method of propagation	Name of plant
1.	
2.	
3.	
4.	

2

2

2

2

Total Mark

Please see over/.....

MARKS

Q6 a) Describe the sowing of **EACH** of the following types of seed in open ground (sowing depth and spacing):

- i) parsnip (*Pastinaca sativa*);
- ii) carrot (*Daucus carota*);
- iii) pea (*Pisum sativum*);
- iv) runner bean (*Phaseolus coccineus*).

2
2
2
2

i).....

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.....

.....

.....

ii).....

.....

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.....

.....

iii).....

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.....

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iv).....

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b) State **TWO** limitations of producing plants from seed.

2

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Total Mark

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**The Royal Horticultural Society, Wisley, Woking, Surrey GU23 6QB.
Charity Registration Number: 222879/SC038262**

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UNDERSTANDING PLANT PROPAGATION

Level 2

Monday 11 February 2019

Candidates Registered	713		Total Candidates Passed	499	84%
Candidates Entered	594	83%	Passed with Commendation	276	46%
Candidates Absent/Withdrawn	98	15%	Passed	221	38%
Candidates Deferred	11	2%	Failed	97	16%

Senior Examiner's Comments:

- Candidates should be able to demonstrate a good range of plant knowledge and be able to give accurately named plant examples where appropriate. Common names and generic names are often too vague and cannot be rewarded in the positive manner that genus, species and where appropriate, variety/cultivar can. This is particularly important when answering questions relating to particular (named) plant(s). Marks can only be awarded for these narratives where the example(s) are correctly and fully identified.
- Candidates must be able to display accurate knowledge of the technical terms and concepts detailed in the syllabus, in the context of horticulture and also be aware that wider interpretation will not be rewarded. The examination should be regarded as a possible introduction to higher level studies, which will only be open to those who are in possession of a clear understanding of the horticultural terms and concepts which are current.
- The introductory rubric given on the first page of each question paper should be read carefully by candidates. At each examination there are a significant number of candidates who ignore or misread the instructions given and consequently may not perform as well as they could have done.

- 4 Candidates should pace themselves during each paper. The most successful candidates allow sufficient time to read the question thoroughly before answering it and also take time to read through their answers. They should take care to write as legibly as possible, so that the examiner is in no doubt about what is intended.
- 5 Candidates need to interpret key words within questions, particularly those such as 'state', 'list' and 'describe'. Questions requiring descriptions or explanations obviously require a more detailed answer than those requiring a list.
- 6 It is important to ensure that responses to questions are to the point. Candidates should bear in mind that small sketches might be used to convey information more succinctly than words.
- 7 Successful candidates ensure that their answers are focused and to the point. It is disappointing when they cannot be rewarded for their efforts because the answer is irrelevant to the particular question. Candidates should take note of the mark allocation for specific sections and allocate their time and efforts accordingly.
- 8 Diagrams can enhance an answer and where appropriate can replace detailed descriptions. They should be large, clear and well annotated, ensuring that labels are properly attached to the features they describe. Diagrams should preferably be in pencil. Colour may be used successfully but only where it is relevant to the answer.
- 9 In each examination it is clear that some candidates are ill prepared to answer papers of the type set. It is essential that candidates have the opportunity to practice questions. Ideally some papers should be answered in a time constrained situation. Appropriate feedback must, in any case be provided.

Q1 a) Name **ONE** example of a plant with **EACH** of the following types of seed by completing the table below:

Type of seed	Name of plant
Orthodox (dry) vegetable	
Orthodox (dry) flower	
Recalcitrant (moist)	

1
1
1

b) Describe the method of storage for orthodox (dry) seeds.

2

c) Describe the preparation of a **NAMED** fleshy fruit for seed storage under **EACH** of the following headings:

- i) harvesting;
- ii) maceration;
- iii) separation.

1
2
1

NAMED fleshy fruit

1

Q1a) The majority of candidates were able to name specific types of seed and gained full marks. Suitable answers included:
Orthodox (dry) vegetable e.g. *Phaseolus coccineus*, *Lactuca sativa*, *Daucus carota*
Orthodox (dry) flower e.g. *Nigella damascena*, *Lobelia erinus*, *Begonia semperflorens*
Recalcitrant (moist) e.g. *Quercus robur*, *Castanea sativa*, *Aesculus hippocastanum*

Q1b) The method of storage for orthodox (dry) seeds was described well by most candidates who were awarded maximum marks. Acceptable answers included: Orthodox (dry) seeds require dry, cool conditions which are provided by placing the seed in a sealed container with silica gel to maintain a dry atmosphere and placing them in a refrigerator at a temperature of 4°C.

Q1c) Most candidates provided a good description of the preparation of a named fleshy fruit e.g. *Solanum lycopersicon*, *Sorbus aucuparia*, *Cotoneaster horizontalis* and gained full marks. These included:

- i) **Harvesting**
Harvest healthy fruit which is free from damage when it is ripe.
- ii) **Maceration**
Macerate the fruit by pressing the fruit with a board, squash by hand or scooping out the seeds from the flesh. The pulp can also be fermented in water for a few days e.g. *Solanum lycopersicon*.
- iii) **Separation**
The seeds can be separated from the flesh by placing the pulp in a bucket of water. The flesh and dead seeds float and the live seeds sink to the bottom. Seeds can be separated with the use of a sieve.

Q2 Describe the propagation of ferns from spores under **EACH** of the following headings:

- | | | |
|------|-----------------------|----------|
| i) | collection of spores; | 4 |
| ii) | sowing media; | 2 |
| iii) | method of sowing. | 4 |

Q2 Marks were awarded to candidates who provided good descriptions of the propagation of fern spores. Suitable answers included:

- i) **Collection of Spores**
Spores are collected from healthy, true to type plants on a dry day. The spores must be ripe, dark in colour and not empty. Fronds are detached from the parent plant and placed inverted into a clean paper bag or envelope and labelled. Spores are screened and separated from the chaff before placing in an airtight container and stored in dry conditions.
- ii) **Sowing Media**
It is essential that the sowing media is sterile e.g. loamless seed sowing media, bark, peat, brick dust or agar gel. The sowing media should be finely textured, free draining and well aerated.
- iii) **Method of Sowing**
Seed trays or petri dishes must be sterilised before filling them with the sowing media which is consolidated to provide a level surface. The trays are then stood in a tray of sterilised water e.g. distilled water. The spores are sown thinly and evenly on the surface of the sowing media and covered with a sheet of glass or a suitable plastic covering e.g. cling film. All containers must be labelled.

Q3 a) State what is meant by the term vegetative propagation.

2

b) List **FOUR** distinct artificial methods of vegetative propagation, giving a **NAMED** plant example for **EACH** by completing the table below:

Artificial method of propagation	Name of plant
1.	
2.	
3.	
4.	

2

2

2

2

Q3a) Candidates who stated that vegetative propagation involves asexual reproduction using parts of the plant stem, leaves and roots which results in the reproduction of a clone (genetically identical material) gained maximum marks.

Q3b) The majority of candidates provided a range of suitable artificial methods of vegetative propagation with plant examples and gained full marks. These included:

Softwood cuttings – *Pelargonium zonale*, *Fuchsia magellanica*

Semi-ripe cuttings – *Camellia japonica*, *Rosmarinus officinalis*

Hardwood deciduous cuttings – *Cornus alba*, *Buddleja davidii*

Evergreen cuttings – *Chamaecyparis lawsoniana*, *Ilex aquifolium*

Simple layering – *Cornus alba*, *Rhododendron arboreum*

Serpentine layering – *Clematis montana*, *Wisteria floribunda*

Air layering – *Ficus elastica*

Leaf lamina cuttings – *Begonia rex* Cultorum Group, *Streptocarpus rexii*

Leaf petiole cuttings – *Saintpaulia ionantha*, *Peperomia caperata*

Leaf bud cuttings – *Camellia japonica*

Division – *Alchemilla mollis*, *Hosta fortunei*

Grafting or budding – *Malus sylvestris*, *Pyrus communis*

Q4 Describe the propagation of *Fuchsia* sp. under **EACH** of the following headings:

- | | | |
|------|--|----------|
| i) | collection of cutting material; | 4 |
| ii) | preparation of the cuttings; | 3 |
| iii) | growing media and insertion of the cuttings. | 3 |

Q4 Candidates who were able to provide good descriptions of the propagation of *Fuchsia* sp. were awarded full marks. Acceptable answers included:

- i) **Collection of cutting material**
The cuttings are taken in spring and early summer from current season's growth which is true to type and pest and disease free. The cutting material is collected early in the day, when it is turgid, above a node from the parent plant and placed in a polythene bag.
- ii) **Preparation of the cuttings**
Cuttings are prepared by cutting below a node (although *Fuchsia* sp. can be propagated by inter nodal cuttings), with an overall length of 40 -50mm. The lower pair of leaves are removed to avoid them rotting in the growing media. Hormone rooting powder is not required for cuttings of *Fuchsia* sp.
- iii) **Growing media and insertion of the cuttings**
A suitable rooting media could include; peat/ bark with perlite, rock wool, vermiculite or the use of aquaponics. The cuttings are inserted into a clean tray/container/pot/ module to a depth of 25mm, ensuring that the foliage does not touch the growing media.

Q5 Describe **ONE** method used to propagate *Streptocarpus* sp. by leaf lamina cuttings under **EACH** of the following headings:

- | | | |
|------|---|----------|
| i) | preparation of the cuttings (not collection); | 4 |
| ii) | growing media and insertion of the cuttings; | 4 |
| iii) | rooting environment. | 2 |

Q5 Maximum marks were gained by candidates who described a suitable method to propagate *Streptocarpus* sp. by leaf lamina cuttings. The best answers included:

- i) **Preparation of the cuttings (not collection)**
The cutting material is prepared on a flat clean tile or surface using a sharp clean knife. Horizontal cuttings 25 – 35mm in length are made into chevrons or the whole leaf can be cut either side of the midrib which is discarded. Hormone rooting powder is not used on leaf lamina cuttings.

- ii) **Growing media and insertion of the cuttings**
Peat or a peat substitute with perlite or vermiculite is suitable as a growing media for *Streptocarpus* sp. cuttings. The cuttings should be inserted with the proximal end facing downwards to a depth of 12mm in a vertical position. The cuttings should be spaced appropriately so that they are not touching each other.

- iii) **Rooting environment**
A closed case or a fogging unit with bottom heat are suitable rooting environments for *Streptocarpus* sp. cuttings. A basal temperature of 18°C - 24°C is ideal. Shading is required for *Streptocarpus* sp. as they have hairy leaves which can be scorched when exposed to direct sunlight.

Q6 a) Describe the sowing of **EACH** of the following types of seed in open ground (sowing depth and spacing):

- | | | |
|------|---|----------|
| i) | parsnip (<i>Pastinaca sativa</i>); | 2 |
| ii) | carrot (<i>Daucus carota</i>); | 2 |
| iii) | pea (<i>Pisum sativum</i>); | 2 |
| iv) | runner bean (<i>Phaseolus coccineus</i>). | 2 |

b) State **TWO** limitations of producing plants from seed. **2**

Q6a) To achieve maximum marks candidates were required to describe the sowing of specific types of seed in open ground. The best answers included:

- i) **Parsnip** (*Pastinaca sativa*)
Sown to a depth of 10 – 12mm in ‘V’ shaped drills with the seeds sown in stations of 3 - 4 seeds 70 – 100mm apart. Seeds can also be sown thinly in ‘V’ shaped drills.
- ii) **Carrot** (*Daucus carota*)
Sown thinly in ‘V’ shaped drills 10 – 12mm deep.
- iii) **Pea** (*Pisum sativum*)
Sown in a flat bottomed drill at a depth of 50mm and seeds spaced 50mm apart in the drill. Alternatively seed can be sown in a ‘V’ shaped drill 50mm deep and seed spaced 50mm apart in the drill.
- iv) **Runner bean** (*Phaseolus coccineus*)
Station sow seeds 2 per station with seeds within an individual station 50mm apart and 50mm deep using a dibber. Stations can be 300 – 600mm apart depending on the method of support for the plants. Alternatively seed can be sown in a ‘V’ shaped drill 150 – 300mm apart and 50mm deep.

Q6b) The best candidates were able to provide a range of limitations of producing plants from seed. These included:

- Some plants do not produce viable seed
- Some seeds are difficult to germinate due to the presence of dormancy factors and issues with viability or adverse environmental conditions
- There is an increased risk of a lack of uniformity in the resultant plants grown from seed as they are genetically variable
- It takes longer to produce a mature plant from seed compared to one grown from a cutting
- Some seed are difficult to store for a long period of time.
