



R2104

UNDERSTANDING PLANT PROPAGATION

Level 2

Monday 20 June 2022

15:20 – 16:10

Written Examination

Candidate Number:

Candidate Name:

Centre 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 spaces 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. Ensure that all diagrams are labelled accurately with the line touching the named object;
- 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.

ANSWER ALL QUESTIONS

MARKS

Q1 a) Describe how **EACH** of the following environmental requirements can be provided for germinating seeds in a protected structure by completing the table below:

Requirements	Provision of environments
Moisture	
Suitable temperature	
Oxygen	

2

2

2

b) Name **ONE** distinct plant which demonstrates **EACH** of the following types of germination by completing the table below:

Method of germination	Plant name
Hypogeal	
Epigeal	

1

1

c) Identify **TWO** benefits of propagating plants from seed.

2

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Total Mark

Please see over/.....

MARKS

Q2 Describe how to sow *Daucus carota* (carrot) outdoors, under **EACH** of the following headings:

- i) time of year
- ii) preparation of seed bed
- iii) method of sowing
- iv) aftercare

1
4
3
2

i)

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ii)

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iii)

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iv)

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Total Mark

Please turn over/.....

MARKS

Q3 Describe the propagation of ferns from spores under **EACH** of the following headings:

- i) collection of spores
- ii) sowing media
- iii) method of sowing

4
2
4

i).....

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ii).....

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Total Mark

Please see over/....

MARKS

Q4 a) State how **EACH** of the following plants are propagated by completing the table below.

Plant	Method of propagation
<i>Saintpaulia ionantha</i>	
<i>Streptocarpus rexii</i>	
<i>Camellia japonica</i>	
<i>Begonia Rex</i> Cultorum group	

1
1
1
1

b) Describe the environmental conditions required for **ONE** of the plants propagated in a) to ensure successful rooting.

4

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c) Name **ONE** pest and **ONE** disease that can affect cuttings during the rooting process.

2

.....

Total Mark

Please turn over/.....

MARKS

Q5 a) Name **ONE** distinct plant that can be propagated by **EACH** of the following types of layering by completing the table below:

Layering method	Named plant
Simple	
Serpentine	
Air	

1

1

1

b) Describe the technique for **ONE** type of layering named above under **EACH** of the following headings:

- i) method
- ii) aftercare

4

3

i).....

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ii).....

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Total Mark

Please see over/.....

MARKS

Q6 Describe the propagation of *Hosta sp.* under **EACH** of the following headings:

- i) time of year
- ii) lifting
- iii) method of division
- iv) aftercare

- 1**
- 3**
- 2**
- 4**

i).....

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ii).....

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iii).....

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iv).....

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Total Mark

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Charity Registration Number: 222879/SC038262**



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UNDERSTANDING PLANT PROPAGATION

Level 2

Monday 20 June 2022

15:20 – 16:10

Candidates Registered	1009		Total Candidates Passed	731	87%
Candidates Entered	835	83%	Passed with Commendation	406	48%
Candidates Absent/Withdrawn	143	14%	Passed	325	39%
Candidates Deferred	30	3%	Failed	105	13%

Senior Examiner's Comments:

- 1 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.
- 2 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.
- 3 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) Describe how **EACH** of the following environmental requirements can be provided for germinating seeds in a protected structure by completing the table below:

Requirements	Provision of environments
Moisture	
Suitable temperature	
Oxygen	

2
2
2

b) Name **ONE** distinct plant which demonstrates **EACH** of the following types of germination by completing the table below:

Method of germination	Plant name
<i>Hypogeal</i>	
<i>Epigeal</i>	

1
1

c) Identify **TWO** benefits of propagating plants from seed.

2

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**Q1a)** The best candidates provided good descriptions of the provision of specific environmental requirements for germinating seeds in a protected structure and achieved maximum marks. Suitable answers included:

| <b>Requirements</b>         | <b>Provision of environments</b>                                                                                                                                                                                        |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Moisture</b>             | Watering and covering the container with glass or polythene.<br><br>Water stored in the organic content of the growing media.<br><br>Capillary matting or the use of a sand bed and the use of mist or fogging systems. |
| <b>Suitable temperature</b> | Using the ambient air temperature in a protected structure.<br><br>Bottom heat provided by soil warming cables or a heated mat at a temperature of 16-24°C.<br><br>A heated propagator with a thermostatic control.     |
| <b>Oxygen</b>               | Open textured growing media including materials e.g. perlite or horticultural grit.<br><br>Not over compacting the growing media.                                                                                       |

|  |                                                                                                                                        |
|--|----------------------------------------------------------------------------------------------------------------------------------------|
|  | Periodic ventilation to purge the build-up of carbon dioxide.<br>Avoiding waterlogging by overwatering.<br>Sowing density of the seed. |
|--|----------------------------------------------------------------------------------------------------------------------------------------|

**Q1b)** The majority of candidates were able to name plants that demonstrated specific types of germination and were awarded full marks. These included:

| <b>Method of germination</b> | <b>Plant name</b>                                        |
|------------------------------|----------------------------------------------------------|
| <b>Hypogeal</b>              | <i>Vicia faba</i> or<br><i>Zea mays</i>                  |
| <b>Epigeal</b>               | <i>Phaseolus vulgaris</i> or<br><i>Helianthus annuus</i> |

**Q1c)** A range of benefits of propagating plants from seed were provided by many candidates who gained full marks. Acceptable answers included:

- allows genetic variation
- enables adaption to the plants' environment
- creates more plants to avoid extinction
- hybrid vigour is obtained as a result of genetic variation
- seeds are easily dispersed
- new cultivars are produced
- less risk of transferring pests and diseases.

**Q2** Describe how to sow *Daucus carota* (carrot) outdoors, under **EACH** of the following headings:

- |                             |          |
|-----------------------------|----------|
| i) time of year             | <b>1</b> |
| ii) preparation of seed bed | <b>4</b> |
| iii) method of sowing       | <b>3</b> |
| iv) aftercare               | <b>2</b> |

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Q2) Good descriptions of how to sow *Daucus carota* (carrot) outdoors were provided by many candidates who achieved full marks. Suitable answers included:

i) Time of year

Daucus carota can be sown outdoors from mid-March to July.

ii) Preparation of seed bed

Primary cultivation is carried out by single digging or forking and large stones are removed to avoid ‘forking of the tap roots of *Daucus carota*. The technique, ‘stale’ seed bed can be used to ensure that all weeds are removed prior to sowing. The area should be roughly raked level and then consolidated to remove any large air pockets. The fertiliser super phosphate can be applied, if required for root growth at this stage. Final raking to create a tilth of 12mm is carried out prior to sowing.

iii) Method of sowing

Drills 10-20mm deep are drawn 150-300mm apart. A continuous line of seed is sown evenly and thinly. The seeds are covered by drawing the soil over them using the back of the rake and tamped down. The bottom of the seed drill can be watered before the seed is sown or after covering.

iv) Aftercare

Daucus carota should be kept weed free and watered in dry weather. They can be covered with enviro mesh to protect them from carrot root fly and will require careful thinning.

Q3 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 |

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**Q3)** Candidates who had a good knowledge of the propagation of ferns from spores were able to provide detailed descriptions and gained maximum marks.

**i) Collection of spores**

It is important to collect spores at the correct stage when the sporangia are ripe and the saurus are brown but not empty.

Collection of spores should be carried out on a still, dry day from plants that are true to type and free from pests and diseases.

Detached fronds should be inverted onto a white sheet of paper or into a white paper bag. Ensure that the spores are labelled. Dry the spores for a week at a temperature of approximately 21°C and then screen them so that any debris (chaff) can be separated before transferring the spores to a dry airtight container.

**ii) Sowing media**

A range of sowing media can be used e.g. loamless, peat, brick dust or agar gel. The sowing media must be sterile which can be carried out by placing a paper kitchen towel over the sowing media and then pouring boiling water over it in the container. This is then covered with cling film to maintain its sterility.

**iii) Method of sowing**

Ensure that the sterilised sowing media in the container is level before sowing the spores broadcast, evenly and thinly by tapping the sheet of paper they are on. The spores should not be covered with sowing media but a sheet of clean glass, Perspex or cling film.

**Q4 a)** State how **EACH** of the following plants are propagated by completing the table below.

| <b>Plant</b>                                        | <b>Method of propagation</b> |
|-----------------------------------------------------|------------------------------|
| <b><i>Saintpaulia ionantha</i></b>                  |                              |
| <b><i>Streptocarpus rexii</i></b>                   |                              |
| <b><i>Camellia japonica</i></b>                     |                              |
| <b><i>Begonia Rex</i><br/><b>Cultorum group</b></b> |                              |

**1**

**1**

**1**

**1**

**b)** Describe the environmental conditions required for **ONE** of the plants propagated in a) to ensure successful rooting.

**4**

**c)** Name **ONE** pest and **ONE** disease that can affect cuttings during the rooting process.

**2**



**Q4a)** Many candidates were able to provide the method of propagation for specific plants and were awarded full marks. Acceptable answers included:

| <b>Plant</b>                             | <b>Method of propagation</b>                                         |
|------------------------------------------|----------------------------------------------------------------------|
| <b><i>Saintpaulia ionantha</i></b>       | Leaf petiole cuttings.                                               |
| <b><i>Streptocarpus rexii</i></b>        | Leaf lamina sections or midrib cuttings.                             |
| <b><i>Camellia japonica</i></b>          | Leaf bud cuttings or semi-ripe stem cuttings.                        |
| <b><i>Begonia rex</i> Cultorum group</b> | Leaf lamina cuttings i.e. leaf squares or whole leaf with veins cut. |

**Q4b)** Good descriptions of the environmental conditions required for specific plants to ensure successful rooting were provided by candidates who achieved full marks. Suitable answers included:

Cuttings require a basal temperature of 18-21°C and an aerial temperature 3-4° lower. Aerial conditions should be humid to avoid excessive moisture loss through transpiration but not stagnant. Cuttings can be placed in a propagating case, closed case, which should be shaded to avoid leaf scorch or a fogging unit.

**Q4c)** Most candidates named suitable pests and diseases that can affect cuttings during the rooting process and gained maximum marks. These included:

**Pest**

Aphids, mealy bug, two spotted mite, sciarid fly, whitefly, slug.

**Disease**

Damping off, grey mould, downy mildew.

**Q5 a)** Name **ONE** distinct plant that can be propagated by **EACH** of the following types of layering by completing the table below:

| <b>Layering method</b> | <b>Named plant</b> |
|------------------------|--------------------|
| <b>Simple</b>          |                    |
| <b>Serpentine</b>      |                    |
| <b>Air</b>             |                    |

1  
1  
1

**b)** Describe the technique for **ONE** type of layering named above under **EACH** of the following headings:

- i) *method*
- ii) *aftercare*

4  
3

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Q5a) Suitable plants which can be propagated by specific types of layering were named by many candidates who were awarded full marks. Acceptable answers included:

Layering method	Named plant
Simple	<i>Cotinus coggygria</i> 'Royal Purple' <i>Corylus maxima</i> 'Purpurea'
Serpentine	<i>Clematis montana</i> <i>Wisteria sinensis</i>
Air	<i>Ficus elastica</i> <i>Magnolia grandiflora</i>

Q5b) The majority of candidates described simple layering and achieved full marks. Suitable answers included:

i) Method

Simple layering is carried out from early spring to late autumn on material that is true to type and free from pests and diseases. Material that is vigorous and produced during the previous growing season is selected for layering. The soil should be weed free and well prepared with the incorporation of organic matter. The selected stem is bent down into a 10cm deep trench approximately 40cm from the tip and secured using 'U' shaped pegs. Any side shoots or foliage at this point are removed. The point at which the shoot is buried can be wounded

or constricted and treated with hormone rooting powder to encourage rooting. The shoot is covered with soil and a cane inserted next to it. The shoot is tied to the cane with raffia to support it in a vertical direction.

ii) **Aftercare**

The layered shoots should be mulched and kept watered at all times. Weed control is important as is monitoring and controlling any pests and diseases identified. When the layer is well rooted the following autumn, it can be severed from the parent plant.

Q6 Describe the propagation of *Hosta* sp. under **EACH** of the following headings:

- | | | |
|------|---------------------------|----------|
| i) | <i>time of year</i> | 1 |
| ii) | <i>lifting</i> | 3 |
| iii) | <i>method of division</i> | 2 |
| iv) | <i>aftercare</i> | 4 |

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**Q6)** Maximum marks were achieved by candidates who were able to describe the propagation of *Hosta* sp. Suitable answers included:

**i) Time of year**

The best time of year to propagate *Hosta* sp. is in late March or April when the plant is commencing growth. It can also be propagated in early autumn when the leaves are beginning to die back.

**ii) Lifting**

Plants that are true to type and pest and disease free are carefully lifted using a fork or a spade. The clumps should be washed off to expose the growth buds and placed in a plastic bag to prevent drying out.

**iii) Method of division**

The plant is placed on a bench or table and checked for the presence of vine weevil larvae. Using a large sharp knife, the clump is divided into smaller clumps containing either one or several buds. If the centre of the plant is too old it can be discarded.

**iv) Aftercare**

Smaller divisions can be potted into 2 litre containers using John Innes No.2 potting compost or a loamless equivalent. Larger divisions can be replanted into open ground which is weed free and where organic matter has been incorporated. When planting the growth buds must be level with the surface of the soil. All plants should be kept watered, mulched and treated to prevent damage by

slugs. This can in the form of a nematode drench on the soil or by the use of ferric phosphate pellets.

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