



R2104

UNDERSTANDING PLANT PROPAGATION

Level 2

Monday 19 June 2017

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.

ANSWER ALL QUESTIONS

MARKS

Q1 a) State the meaning of **EACH** of the following seed parts by completing the table below.

Seed part	Meaning
testa	
cotyledon	
radicle	
plumule	
epicotyl	
hypocotyl	

1
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1

b) Name **TWO** vegetable crops propagated by seed (using genus and species).

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c) State **TWO** conditions required to store the seeds of **ONE** of the crops named in b).

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Total Mark

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MARKS

Q3 a) Describe **THREE** distinct materials suitable for the rooting of cuttings.

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ii).....
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iii).....
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2

b) State how **ONE** of the materials described in a) encourages the successful rooting of softwood cuttings.

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2

c) State the meaning of **EACH** of the following terms:

- i) sticking;
- ii) wounding.

1
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i).....
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ii).....
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Total Mark

Please see over/.....

MARKS

Q4 a) Describe a suitable environment for rooting cuttings of **EACH** of the following plants:

- i) *Pelargonium zonale*;
- ii) *Fuchsia magellanica*;
- iii) *Cornus alba*;
- iv) *Buddleja davidii*;
- v) *Chamaecyparis lawsoniana*.

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v).....

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Total Mark

Please turn over/.....

MARKS

Q5 a) State **FOUR** distinct limitations of propagating plants by vegetative means.

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b) Describe the post-rooting aftercare of **EACH** of the plants listed below:

- i) divisions of *Alchemilla mollis*;
- ii) leaf lamina cutting of *Begonia rex*;
- iii) air layer of *Ficus elastica*.

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Total Mark

Please see over/.....

MARKS

Q6 Describe the propagation of *Cucurbita pepo* in a protected environment under **EACH** of the following headings:

- i) preparation for sowing;
- ii) sowing technique;
- iii) aftercare (pre-emergence).

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Total Mark

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Sharing the best in Gardening

R2104

UNDERSTANDING PLANT PROPAGATION

Level 2

Monday 19 June 2017

Candidates Registered	703		Total Candidates Passed	463	78.74%
Candidates Entered	588	83.64%	Passed with Commendation	210	35.71%
Candidates Absent/Withdrawn	106	15.08%	Passed	253	43.03%
Candidates Deferred	9	1.28%	Failed	125	21.26%

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) State the meaning of **EACH** of the following seed parts by completing the table below.

Seed part	Meaning	
testa		1
cotyledon		1
radicle		1
plumule		1
epicotyl		1
hypocotyl		1

b) Name **TWO** vegetable crops propagated by seed (using genus and species).

2

c) State **TWO** conditions required to store the seeds of **ONE** of the crops named in b).

2

Q1a) The majority of candidates were able to state the meaning of specific seed parts and gained maximum marks. Suitable answers included:

- Testa is the seed coat or protection of the embryo
- Cotyledon is the seed leaf and can be used for storage food/starch
- Radicle is the first young root/embryonic root
- Plumule is the young shoot/emerging shoot/embryonic shoot
- Epicotyl is the section of stem between the cotyledons and the true leaves
- Hypocotyl is the section of stem between the root and the cotyledons/between embryo and radicle

Q1b) Candidates named a range of suitable vegetable crops grown by seed e.g. *Vicia faba*, *Brassica oleracea*, *Pisum sativum*, *Daucus carota* and were awarded full marks.

Q1c) The best candidates stated that vegetable seeds require cool or low temperatures and a dry atmosphere and gained maximum marks.

Q2 a) Describe the changes that take place within a germinating seed.

6

b) Name **ONE** distinct plant for **EACH** of the following methods of germination by completing the table below.

Method of germination	Plant name
hypogeal	
epigeal	

1

1

c) Identify **TWO** benefits of sexual reproduction to the plant.

2

Q2a) Candidates who included the following points in their descriptions of the changes that take place within a germinating seed achieved full marks.

- Taking in water through the micropyle/testa
- Rising or increased rate of respiration
- Breakdown of the stored food
- Rapid cell division and expansion of the embryo
- Splitting of the seed coat
- Emergence of the radicle
- Emergence of the plumule

Q2b) Most candidates named a suitable plant for each of the methods of germination and gained maximum marks. These included:

Hypogeal – *Vicia faba*, *Zea mays*

Epigeal – *Phaseolus vulgaris*, *Helianthus annuus*

Q2c) Candidates identified a range of suitable benefits of sexual reproduction to the plant and were awarded full marks. These included:

- Enables genetic variation
- Enables the plant to adapt to its environment
- More plants can be created to avoid extinction
- Hybrid vigour results from increased genetic variation
- Wide dispersal of seeds and plants
- Enables the production of new cultivars
- There is less risk of transfer of pests and diseases
- It is the only method of reproduction for some plants e.g. annuals and biennials

Q3 a) Describe **THREE** distinct materials suitable for the rooting of cuttings.

- | | |
|------|----------|
| i) | 2 |
| ii) | 2 |
| iii) | 2 |

b) State how **ONE** of the materials described in a) encourages the successful rooting of softwood cuttings. **2**

c) State the meaning of **EACH** of the following terms:

- | | |
|---------------|----------|
| i) sticking; | 1 |
| ii) wounding. | 1 |

Q3a) Many candidates provided good descriptions of materials suitable for the rooting of cuttings and gained full marks. These included:

- i) **Peat** is ecologically in short supply, variously fibrous or fine in texture, dark in colour, holds moisture and has good aeration.
- ii) **Bark** is a waste product from timber production, finer grades are used for propagation, has a lower pH, good drainage capacity, high aeration level and a low water holding capacity.
- iii) **Coconut Fibre/Coir** is a waste product from coconut production, a very fibrous material, good water holding capacity, moderately acidic, difficult to re-wet.

Candidates who described the following materials were also awarded marks e.g. recycled green waste, perlite, vermiculite, grit/sand, propagation foam, rooting hormone, rockwool, sphagnum moss, loam/John Innes seed and cutting composts.

Q3b) Candidates who stated how the materials used for the successful rooting of cuttings either separately e.g. peat or in combination with each other provide the following gained maximum marks:

- Moisture to prevent the base of the cutting from desiccating
- Stability for the cutting
- Air for respiration at the base of the cutting to encourage roots to be produced and to allow the roots to respire

Q3c) The majority of candidates were able to state the meaning of the specific terms and were awarded full marks. Suitable answers included:

- Sticking** – Inserting stem cuttings into a rooting media either in a propagating bed indoors or into the open ground.
- Wounding** – The removal of up to 25mm of the bark from the side of the base of the stem of a woody cutting to expose the cambium. This encourages the formation of callus and therefore improve rooting.

MARKS

Q4 a) Describe a suitable environment for rooting cuttings of **EACH** of the following plants:

- | | | |
|------|-----------------------------------|----------|
| i) | <i>Pelargonium zonale</i> ; | 2 |
| ii) | <i>Fuchsia magellanica</i> ; | 2 |
| iii) | <i>Cornus alba</i> ; | 2 |
| iv) | <i>Buddleja davidii</i> ; | 2 |
| v) | <i>Chamaecyparis lawsoniana</i> . | 2 |

Q4) To gain full marks candidates were required to describe suitable environments (either rooting and/or aerial) for rooting cuttings of specific plants. Suitable answers included:

- i) ***Pelargonium zonale*** – growing media e.g. 50:50 peat:grit or peat alternative which is well drained and provides good aeration. They should be placed on an open glasshouse bench as they are fleshy cuttings with a basal temperature of 15-20°C.
- ii) ***Fuchsia magellanica*** – growing media e.g. 50:50 peat:grit or peat alternative and a basal temperature of 15-24°C. A moist aerial environment can be provided by placing the cuttings in a closed case or in a mist unit.
- iii) ***Cornus alba*** – can be propagated either by; softwood, semi-ripe or hardwood cuttings. Hardwood cuttings can be inserted directly in the open ground which is weed free and moist or in pots which are placed in a cold frame or polythene structure.
- iv) ***Buddleja davidii*** – can be propagated by either softwood or hardwood cuttings. Softwood cuttings can be inserted into growing media e.g. 50:50 peat:grit or peat alternative and given a basal temperature of 15-24°C. A moist aerial environment can be provided by placing the cuttings in a closed case or in a mist unit.
- v) ***Chamaecyparis lawsoniana*** – can be propagated by semi-ripe cuttings with a brown wood base. Growing media e.g. 50:50 peat:grit or peat alternative and a basal temperature of 15-24°C are suitable. Cuttings can be placed in a closed case, mist unit or cold frame.

Q5 a) State **FOUR** distinct limitations of propagating plants by vegetative means.

4

b) Describe the post-rooting aftercare of **EACH** of the plants listed below:

- | | | |
|------|--|----------|
| i) | <i>divisions of Alchemilla mollis;</i> | 2 |
| ii) | <i>leaf lamina cutting of Begonia rex;</i> | 2 |
| iii) | <i>air layer of Ficus elastica.</i> | 2 |

Q5a) Most candidates provided a range of limitations of propagating plants by vegetative means and gained full marks. Acceptable answers included:

- Limited availability of plant material
- Lack of genetic variation
- Transmission of virus diseases
- Some techniques require a higher level of skill e.g. grafting
- Requirement for a range of propagation environments
- More space required in the early stages of propagation

Q5b) Candidates who described the post-rooting aftercare of specific plants were awarded full marks. Suitable answers included:

- i) ***Alchemilla mollis*** – divisions should be carefully planted in weed free ground which has had organic matter and fertiliser added and kept watered. If divisions have been potted up into suitable sized pots they should be placed on a standing down area or placed in a cold frame. The pots should be kept weed free, watered and fertiliser applied if required.
- ii) ***Begonia rex*** – cuttings should be kept moist and shaded in a closed case and gradually weaned off by reducing the temperature and humidity levels. Any dead material should be removed and checks for pests and diseases carried out regularly before potting off the rooted cuttings.
- iii) ***Ficus elastica*** – can be propagated by air layering or leaf bud cuttings. Air layers should be carefully removed from the parent plant and potted off into a suitable sized pot using an appropriate growing media and staked. The plants should be kept moist and kept in a closed environment initially where regular checks for pests and diseases would be made.

Cuttings should be kept moist and shaded in a closed case and gradually weaned off by reducing the temperature and humidity levels. Any dead material should be removed and checks for pests and diseases carried out regularly before potting off the rooted cuttings.

Q6 Describe the propagation of *Cucurbita pepo* in a protected environment under **EACH** of the following headings:

- | | |
|---------------------------------|----------|
| i) preparation for sowing; | 3 |
| ii) sowing technique; | 4 |
| iii) aftercare (pre-emergence). | 3 |

Q6) Marks were awarded to candidates who provided good descriptions of the propagation of *Cucurbita pepo*. Suitable answers included:

- i) **Preparation for Sowing** – Clean 7-9cm pots or individual modules are used. Sterilised growing media e.g. John Innes seed or a loam-less equivalent is used to fill the pots. This is carried out by overfilling the pots and tapping them down.

- ii) **Sowing Technique** – The pots are filled two thirds full. Two seeds are sown per pot on their edge 10-12mm apart and to a depth of 10-20mm. The pots are topped up to cover the seed and labelled.

- iii) **Aftercare (pre-emergence)** – The pots are placed in a warm environment e.g. a propagator or a closed case at a temperature of 20-24°C and kept watered. Regular checks are made for pests and diseases.
