R2104
UNDERSTANDING PLANT PROPAGATION
Level 2
Monday 10 February 2020
14:50 – 15:40
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.
Q1 a) Describe what is meant by the term 'seed'.

b) Label the diagram of the internal and external structure of *Phaseolus vulgaris* (French Bean).

c) State **TWO** horticultural benefits of propagating plants by seed.

Please see over/.....
Q2 a) State if the following plants have orthodox (dry) or recalcitrant (moist) seeds by placing a tick(✓) in the appropriate box in the table below:

<table>
<thead>
<tr>
<th>Plant</th>
<th>Orthodox (dry)</th>
<th>Recalcitrant (moist)</th>
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<tbody>
<tr>
<td>Lolium perenne</td>
<td></td>
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<td>Aesculus hippocastanum</td>
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b) Describe the preparation of the fruit *Solanum lycopersicum* (tomato) for seed storage under EACH of the following headings:

i) harvesting

Please turn over/.....
Q3 a) Describe the ground preparation for sowing *Pisum sativum* (pea).

*(DO NOT INCLUDE DETAILS OF DIGGING)*

b) Describe how to sow *Pisum sativum* (pea) under **EACH** of the following headings:

i) **TWO** distinct methods of sowing  
ii) time of year when sown (in months)  
iii) depth of sowing  
iv) spacing of the seed  
v) protection after sowing  

i) .........................................................................................................................

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ii) .........................................................................................................................

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v) .........................................................................................................................

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Please see over/....
Q4 a) State **FOUR** benefits of vegetative propagation.

b) Describe the effects of **EACH** of the following on the successful rooting of softwood stem cuttings:

i) juvenility

ii) plant health

ⅱ)

c) State **TWO** environmental conditions suitable for softwood cuttings.
Q5 Describe the propagation of *Chamaecyparis spp.* *(e.g. lawsoniana)* (False Cypress) under the following headings:

i) collection of material
ii) preparation of cuttings
iii) suitable environment
iv) rooting media

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Please see over/.....
Q6 a) Name **TWO** plants propagated by division.

b) Describe the division of **ONE** of the plants named above under the following headings:

   i) time of year when divided (in months)
   ii) lifting the plant
   iii) method of division

Plant example

i)

ii)

iii)
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Candidates Registered  850
Candidates Entered  705  83%
Candidates Absent/Withdrawn  121  14%
Candidates Deferred  24  3%

Total Candidates Passed  621
Passed with Commendation  379  54%
Passed  242  34%
Failed  84  12%

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.
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.

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.

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.

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.

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.

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 what is meant by the term ‘seed’.

b) Label the diagram of the internal and external structure of Phaseolus vulgaris (French Bean).

c) State TWO horticultural benefits of propagating plants by seed.

Q1a) The best candidates described the term ‘seed’ as the result of sexual reproduction containing the embryo plant and a food supply contained in a seed coat and achieved full marks.

Q1b) Most candidates were able to identify the labels on the Phaseolus vulgaris and were awarded full marks. Correct answers were:

- Testa
- Cotyledon
- Plumule
- Hypocotyl
- Radicle
- Micropyle
Q1c) Maximum marks were awarded to candidates who provided a suitable range of horticultural benefits of propagating plants by seed. These included:

- Produces variation from which new cultivars can be developed
- Only method of propagation for some species
- May obtain large number of seeds from each plant
- Seed can be stored easily
- Can avoid transmission of virus
Q2 a) State if the following plants have orthodox (dry) or recalcitrant (moist) seeds by placing a tick(✓) in the appropriate box in the table below:

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b) Describe the preparation of the fruit Solanum lycopersicum (tomato) for seed storage under EACH of the following headings:

i) harvesting

ii) macerating, separating and cleaning

Q2a) Candidates who were able to identify the correct type of seed for specific plants achieved full marks. Correct answers are:

- **Lolium perenne** – Orthodox (dry)
- **Aesculus hippocastanum** – Recalcitrant (moist)
- **Quercus robur** – Recalcitrant (moist)
- **Lobelia erinus** – Orthodox (dry)

Q2b) Most candidates provided suitable descriptions of the preparation of *Solanum lycopersicum* for seed storage and gained maximum marks. These included:

i) **Harvesting**
Collect seeds that are true to type or of known provenance, free from pests and diseases when they are ripe.

ii) **Macerating, Separating and Cleaning**
Either place the fruit in water or scoop out the seed and place in water and allow to ferment for approximately three days. By whisking the seed and water the dead seeds and debris can be floated off using a sieve. The live seed can be placed on greaseproof paper or a paper towel to dry.
Q3 a) Describe the ground preparation for sowing 
*Pisum sativum* (pea).

**(DO NOT INCLUDE DETAILS OF DIGGING)**

Describe how to sow *Pisum sativum* (pea) under EACH of the following headings:

b) i) **TWO** distinct methods of sowing
   ii) time of year when sown (in months)
   iii) depth of sowing
   iv) spacing of the seed
   v) protection after sowing

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Q3a) To be awarded full marks candidates were required to describe the ground preparation for sowing *Pisum sativum*. Suitable answers included:

The area to be sown is raked roughly level with a landscape rake before consolidating it by shuffling over the soil with flat feet to remove any large air pockets. A base fertiliser e.g. superphosphate can be applied at a rate of 120g/m² before creating a final tilth using a garden rake to a depth of 50mm.

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Q3b) The majority of candidates were able to describe how to sow *Pisum sativum* and achieved full marks. Suitable answers included:

i) **Methods of Sowing** – Sowing in a narrow or trench drill, station sowing with a dibber or sowing in a gutter.

ii) **Time of Year when Sown** – Late February/March to June or October to November.

iii) **Depth of Sowing** – 50mm

iv) **Spacing of the Seed** – 25-50mm in drills and 25-50mm in each direction in trenches.

v) **Protection after Sowing** – Protect from rodents and birds by using fine mesh netting or cover with a cloche.
Q4 a) State **FOUR** benefits of vegetative propagation.

b) Describe the effects of **EACH** of the following on the successful rooting of softwood stem cuttings:

i) **juvenility**

ii) **plant health**

c) State **TWO** environmental conditions suitable for softwood cuttings.

Q4a) Candidates who provided a suitable range of benefits of vegetative propagation were awarded maximum marks. Acceptable answers included:

- Retains characteristics of parent plant
- There is no need for pollination
- Propagation of clones
- Avoids seed dormancy problems
- Only possible method for some plants
- Plants mature more quickly
- Can control the size of the plant by the use of specific rootstocks when grafting

Q4b) Many candidates were able to provide good descriptions how juvenility and plant health effect successful rooting of softwood stem cuttings and gained full marks. These included:

i) **Juvenility**

Young plants are in active growth, not flowering and display juvenile foliage. Younger wood has a greater capacity for rooting.

ii) **Plant Health**

Plant material must be free from pests, diseases and virus and exhibit good balanced nutrition. It must be grown in the correct light levels to avoid etiolation or scorched foliage.

Q4c) A range of suitable environmental conditions for softwood cuttings were provided by the best candidates who achieved maximum marks. These included:

- Moist conditions i.e. high humidity
- Cooler aerial environment than root environment
- Basal warmth
- Not in direct light
Describe the propagation of Chamaecyparis spp. (e.g. lawsoniana) (False Cypress) under the following headings:

i) collection of material 2
ii) preparation of cuttings 4
iii) suitable environment 2
iv) rooting media 2

Candidates who were able to provide good descriptions of the propagation of Chamaecyparis lawsoniana gained full marks. Suitable answers included:

i) Collection of Material
Material is collected from October to November which should be true to type, pest and disease free with green juvenile foliage. Apical and lateral growth can be collected with an approximate length of 8-12cm or 10-15cm which is turning green to brown at the base.

ii) Preparation of Cuttings
Cuttings are prepared to 8-12cm in length, just below a node with green to brown wood at the base. Foliage is trimmed from the bottom 4-5cm or bottom third of the cutting. The base of the cutting can be wounded or a heel cutting can be prepared. Medium strength hormone rooting powder is applied to the base of the cutting.

iii) Suitable Environment
Cuttings can be placed in a mist unit or a closed case which provide basal heat and a humid environment. Alternatively they can be placed in a cold frame on a north wall.

iv) Rooting Media
This can be a mixture of 50:50 peat or a peat alternative mixed with horticultural grit, perlite or vermiculite. The mixture can be up to 70:30 grit to peat or a peat alternative during the winter.
Q6 a) Name TWO plants propagated by division.

b) Describe the division of ONE of the plants named above under the following headings:

   i) time of year when divided (in months)  
   ii) lifting the plant  
   iii) method of division

Q6a) The majority of candidates named a range of plants that can be propagated by division and were awarded maximum marks. Acceptable answers included:

   *Hosta fortunei, Rhus typhina, Primula denticulata, Alchemilla mollis, Aster amellus, Echinacea purpurea.*

Q6b) Most candidates provided good descriptions of the division of a specific plant and gained full marks. Suitable answers included:

   i) **Time of Year**  
   *Alchemilla mollis* can be divided either between October and November or March and April.

   ii) **Lifting the Plant**  
   The plant is lifted carefully using a spade or fork when the ground is moist but not too wet and any excess soil is removed.

   iii) **Method of Division**  
   Clumps can normally be pulled apart using two hand forks back to back or with the hands. Divisions should be approximately 15cm in diameter for replanting or smaller if being potted. Each division should contain healthy buds and any old sections of the plant should be discarded. Any debris should be removed from the divisions.