RHS

Including Examiners Comments

R3104

UNDERSTANDING APPLIED PLANT PROPAGATION

Level 3

Wednesday 19 June 2024

15:55 – 16:45

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 the anatomical and physiological importance of **EACH** of the following in vegetative propagation:

i) axillary bud **4**
ii) leaf **4**

MARKS

b) State **ONE** method for leaf propagation giving **ONE NAMED** plant example. **2**

Total Mark

Please turn over/…..

Q2 a) Describe what is meant by the 'after ripening' process for seeds. **MARKS 2**

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b) Name **TWO** species having seeds with a requirement for after ripening. **2**

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Please see over/…..

c) Describe the treatment required for **EACH** of the seeds named in b) to promote the germination process.

MARKS
6

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Please turn over/…..

Total Mark

MARKS

Q3 a) State, when using cold frames for plant propagation:

i) **FOUR** distinct benefits **4**
ii) **TWO** limitations **2**

Please see over/…..

		MARKS
b)	State **TWO** distinct uses of a cold frame for plant propagation of **TWO NAMED** plants.	**4**

Total Mark

Please turn over/…..

MARKS

Q4 Describe the production from seed of **ONE NAMED** UK plant for producing a hedgerow under **EACH** of the following headings:

1

i) seed bed preparation **4**
ii) method of sowing seed **2**
iii) after care of seedlings **3**

Please see over/…..

MARKS

Total Mark

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General Points:

Where a plant example is chosen, it is important to write the FULL botanic name and not just a partial name, following the correct naming protocols.

Where named plant examples are required, ***common names are not credited*** *at level 3. Spellings of scientific terms and botanic plant names need to be full and accurate - poor spellings may be penalised.*

Where a number of answers are asked for e.g. ***THREE*** *environmental conditions, only the first three in a list will be marked.*

Note for this paper: there was generally good coverage of topics in each question but a lack of detail given in answers to some areas, such as after ripening in Q2.

Q1) ***Describe the anatomical and physiological importance of EACH of the following in vegetative propagation:***

i) axillary bud

ii) leaf

Q1b) ***State ONE method for leaf propagation giving ONE NAMED plant example.***

Q1

i) The majority of candidates provided a range of suitable responses regarding the importance of the axillary bud. These included; elevated levels of auxin, the presence of the apical meristem, the production of new extension growth and that adventitious buds are formed.

ii) Some leaves can produce roots adventitiously, usually from meristematic tissue/cambium found in the veins. The leaf also provides transport tissue/phloem for photosynthates/stored food to other parts of the cutting as well as water conducting tissue/xylem to enable root formation. Leaves also supply auxin which accumulates at the distal end of the cutting which induces root initials.

Q1b) It is important to use the correct terminology when stating methods of leaf propagation. Suitable answers included: leaf sections or chevrons for *Streptocarpus caulescens* and leaf petiole cuttings for *Streptocarpus ionanthus.*

Q2a) ***Describe what is meant by the 'after ripening' process for seeds.***

Q2b) ***Name TWO species having seeds with a requirement for after ripening.***

Q2c) ***Describe the treatment required for EACH of the seeds named in b) to promote the germination process.***

Q2a) Candidates were expected to describe 'after ripening' as the biochemical or physical changes that occur in a dormant seed to ensure that seed germination takes place.

Credit was also given to candidates who were able to describe that 'after ripening' results in the lowering of ABA (abscisic acid) levels in the seed, an increase in speed of germination and an elimination of light requirement for seed germination in seeds that do not germinate in darkness.

Q2b) Two from a range of suitable species that have a requirement for after ripening were correctly named by most candidates and included:

Fraxinus excelsior, Ilex aquifolium, Sambucus nigra, Tilia cordata.

Q2c) To achieve full marks for this section of the question candidates were expected to provide specific details of the treatment required for the species named to promote the germination process.

Fraxinus excelsior requires a storage moisture content of 10-12% at a temperature of <0ºC. It also requires warm pre-treatment at 15ºC for 20 weeks and cold pre-treatment at 4ºC for 12 weeks.

Ilex aquifolium requires a storage moisture content of 10-12% at a temperature of <0ºC. It also requires warm pre-treatment at 15ºC for 40 weeks and cold pre-treatment at 4ºC for 24 weeks.

Candidates who misunderstood the question and described scarification treatments or only stated that species required warm and cold treatments could not be awarded any marks.

Q3a) ***State, when using cold frames for plant propagation:***

i) FOUR distinct benefits

ii) TWO limitations

Q3b) ***State TWO distinct uses of a cold frame for plant propagation of TWO named plants.***

Q3a) Most candidates had a good knowledge of the benefits and limitations of using cold frames for plant propagation. These included:

i) Cold frames provide a closed protected environment which protects against pest and diseases as well as inclement weather e.g. hail. The temperature within a cold frame can be manipulated to protect plants from low temperatures or to increase growth by raising the temperature. Light levels can be controlled with the use of shading and the overall environment can be controlled to enable plants to be weaned.

ii) Cold frames can be prone to physical damage from the weather and need to be ventilated manually. The lights have to be moved manually which can be difficult and the height of the frame can limit the range of plants that can be grown in cold frames.

Q3b) A range of uses of a cold frame for plant propagation of named plants were provided by many candidates. These included the sowing of hardy annuals in trays e.g. *Lathyrus odoratus,* direct insertion of hardwood cuttings e.g. *Cornus alba* 'Sibirica' or direct insertion of root cuttings e.g. *Acanthus mollis.*

Q4) ***Describe the production from seed of ONE NAMED UK plant for producing a hedgerow under EACH of the following headings:***

i) seed bed preparation

ii) method of sowing seed

iii) after care of seedlings

Q4) The majority of candidates correctly named *Crataegus monogyna* as an example of a UK plant produced from seed for producing a hedgerow. Other accepted plants named included; *Acer campestre, Prunus avium, Prunus spinosa, Malus sylvestris.*

To achieve full marks for this question candidates were expected to provide detailed descriptions of specific aspects of the production of plants from seed for a hedgerow.

i) Weeds should be removed either by hand or with the use of the stale seed bed method for annual weeds or with the use of a translocated herbicide for perennial weeds. Large stones are removed before levelling and consolidation of the seed bed take place. A base dressing can be applied before creating a final tilth.

ii) Seeds are sown broadcast/drilled or precision drilled at a rate per m^2 depending on the size of the seed. The seeds can be covered with soil or horticultural grit to a depth of 3-15mm depending on the size of the seed.

iii) When describing the aftercare requirements of seedlings, it is important for candidates to provide details of the tasks e.g. irrigation, when, how and how often it should be carried out. The same applies to pest and disease monitoring and control, weed control, shading, netting to protect from rodent attack etc.

Candidates who described the seed bed preparation and sowing of seed in a tray or pot could not be awarded any marks for those sections of the question.