

**R3104****UNDERSTANDING APPLIED PLANT PROPAGATION****Level 3****Wednesday 8 February 2023****15:55 – 16:45****Written Examination****Candidate Number:** .....**Candidate Name:** .....**Centre Name:** .....**IMPORTANT – Please read carefully before commencing:**

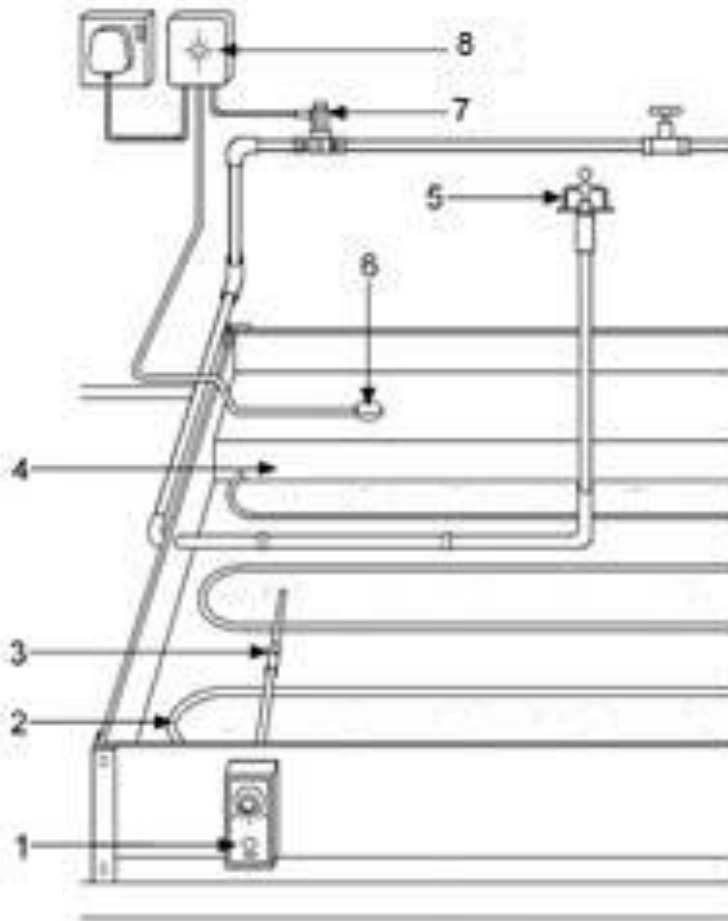
- i) The duration of this paper is **50** minutes;
- ii) **ALL** questions should be attempted;
- iii) **EACH** question carries **10 marks**;
- iv) Write your answers legibly in the spaces provided. It is **NOT** necessary that all lined space is used in answering the questions;
- v) Use **METRIC** 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) Identify the parts 1-8 on the diagram below of a mist propagation unit.

**4**



- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....
- 7.....
- 8.....

- b) State **THREE** benefits and **THREE** limitations of a mist propagation unit by completing the table below.

	<b>Benefits of mist propagation unit</b>	<b>Limitations of mist propagation unit</b>
<b>1.</b>		
<b>2.</b>		
<b>3.</b>		

**2**

**2**

**2**



Total Mark

**Q3** a) Describe **THREE** principles used in the process of grafting which contribute to a successful graft union.

6

**Please see over/.....**

**Please turn over/.....**

**Q4** a) State **THREE** ways in which seedbanks can assist in conserving plant diversity.

3

b) Describe the importance of provenance in conservation propagation from seed.

**3**

**Please see over/.....**



## MARKS

4

- c) State how maximum genetic diversity can be maintained when propagating a **NAMED** UK hedgerow species from seed.

Total Mark

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## R3104

### UNDERSTANDING APPLIED PLANT PROPAGATION

#### Level 3

Wednesday 8 February 2023

<b>Candidates Registered</b>	<b>TBC</b>		<b>Total Candidates Passed</b>	<b>TBC</b>	<b>84%</b>
Candidates Entered	55	TBC%	Passed with Commendation	25	45%
Candidates Absent/Withdrawn	TBC	TBC%	Passed	21	38%
Candidates Deferred	TBC	TBC%	Failed	9	16%

**General comments** - in many cases, candidates presented a proficient level of technical detail covering the topics highlighted by each question.

For the most part, candidates kept to the structure of the questions when presenting answers.

Some candidates' answers were not related to the question. It is especially important that candidates read questions thoroughly before they compose their answers so that they can be sure about what the question is asking.

Q1 Overall, the candidates' answers, apart from a few, were of a lower level.

**Questions** - It is essential to read the question carefully and to note the **key words** before starting to write to ensure answers are relevant. Candidates should take account of the command statements in the question e.g. 'list', 'describe', 'explain', together with the mark allocation, to judge the depth of the answer required. Extra information, even if it is accurate, does not gain extra marks.

Where a number of answers were specified in the question and a candidate gave a list with more than that number, **only the first answers** in the list were marked, e.g. where the question stated 'Name **TWO** locations' or 'State **TWO** ways' only the first **TWO** answers were marked even if the correct answers were given further down. It is helpful (but not essential) if the answers are numbered in the text or separate paragraphs or bullet points are used.

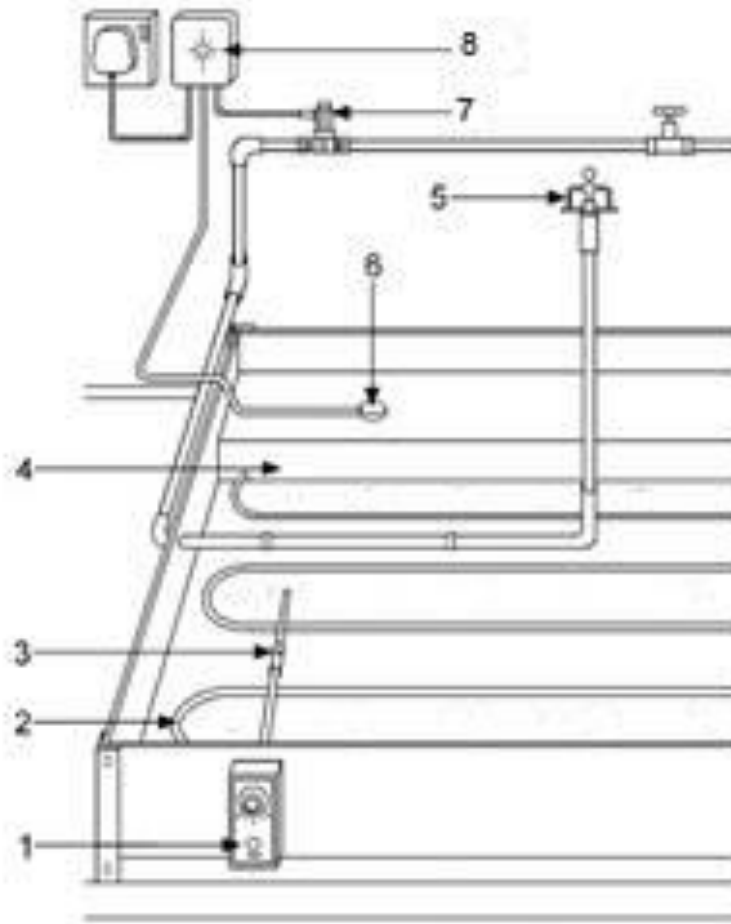
**Plant names** - Where named plant examples were asked for, **full botanical names are required** to achieve full marks: genus, species and where appropriate variety, cultivar etc. needed to be written and spelt correctly. Where genus alone was given, all species in that genus need to show the characteristic asked for to gain any credit. **Common names were NOT accepted** and misspellings were penalised. Candidates needed to use unambiguous plant examples from sources such as the RHS Plant Finder and/or the RHS A-Z Encyclopaedia of Plants together with examples given in the syllabus and avoid obscure or difficult to verify plant examples, which risked being not credited.

**Labels on diagrams must be carefully and correctly positioned** to avoid ambiguity. Marks can be easily lost if this is not followed. Labels must actually touch the appropriate part of the diagram and must not be left hanging in mid air. Annotations on diagrams can be accepted as an alternative to description in the text as long as these are clear and answer the question. No marks were awarded for artistic merit or for unlabelled diagrams.

**Continuation sheets** - Where these have been included, it is vital that the relevant question number is included in the left hand margin if information written here is to be considered. These should also be attached to the answer booklet in the appropriate place and candidates should indicate in their answer booklet that they have written part of their answer on the attached sheet/s.

Q1 a) Identify the parts 1-8 on the diagram below of a mist propagation unit.

4



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- 2.....
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<b>1.</b>		
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<b>3.</b>		

**2**

**2**

**2**

**Q1 a)** Labelling the numbered elements of a mist propagation unit showed a lack of detailed knowledge of the parts. The expected answers were:

- 1 thermostatic temperature control
- 2 soil warming cable/hot water pipes.
- 3 rod thermostat
- 4 insulation layer/propagation media – sand layer
- 5 mist nozzle
- 6 electronic leaf
- 7 solenoid valve
- 8 control box/unit

Where candidates used an understandable expression, but not the totally accurate required term - for example temperature controller for thermostatic temperature control, in 1, then marks were awarded appropriately.

It was disappointing that candidates showed in some cases a less than satisfactory knowledge of a basic piece of propagation equipment widely utilised in the industry.

**b)** The answers required were statements on the limitations and benefits of a mist unit.

For the most part this was well done with limitations and benefits clearly set out with good examples of both relating to the physical operation of a unit, the environment being created and maintained for this purpose or the environmental implications for the plants being propagated.

Benefits included maintaining high relative humidity, lowering of the surrounding air temperature through evaporation, maintaining the turgidity of the cutting, warming the rooting medium to promote quicker rooting, and regulating the frequency of misting so that rooted cuttings can be weaned.

The limitations were listed in full, including costs of setting up and running the system, and potential failures of cuttings in low light in winter, with cuttings prone to fungal infection due to high humidity. Other limitations listed included managing the system for cleanliness of nozzles, and monitoring the actual coverage of the medium by the mist.

- |    |  |   |
|----|--|---|
| Q2 | a) Describe the properties of a bulb that enable it to be used for vegetative propagation. | 4 |
|    | b) Describe <b>ONE</b> method of propagation of a <b>NAMED</b> bulb.                       | 6 |

Q2 a)

This section was quite well done. Expected answers included features of bulb anatomy and physiology that were relevant to its potential for propagation, for example its meristematic basal plate, food storage in leaf bases to provide energy for future growth, and the presence of adventitious buds and axillary buds were mentioned by candidates.

The fact that the bulb is a modified stem was rarely noted.

Some candidates went on to describe propagation techniques in this part of the question, rather than in section b).

- b) The named examples of bulbs suitable for propagation were well done and nomenclature was for the most part relevant and clear. The named example was not always complete, e.g., *Hyacinthus* with species and/or cultivar not named.

For *Hyacinthus orientalis* a suitable method would be scooping and scoring the bulb.

Using a large, healthy bulb in late summer when dormant, scoop out the centre of the basal plate with a sterilised knife and treat the surface with an approved fungicide. Place with basal plate uppermost in coarse growing medium, keep slightly moist and warm, at 18-20°C. Bulblets should form by early spring. Detach these and grow on in gritty compost.

Overall techniques, environment, tools, and equipment were mostly well described, showing a sound grasp of the relevant methods involved.

On occasions the method of propagation described was not suitable for the named bulb. For example, twin scaling or scoring were described by some candidates for a scaly bulb such as lily— but this scaly bulb is not best suited to these techniques.

**Q3** a) Describe **THREE** principles used in the process of grafting which contribute to a successful graft union. **6**

b) State **THREE** factors to be considered when selecting a rootstock for a **NAMED** grafted fruit tree. **4**

**Q3** Answers did not always follow the format of the question.

a) Most candidates included details in their answers which covered the principles of grafting, with good examples.

The main points were:

- rootstock and scion are compatible and at the optimum stage of development
- maximum close cambial contact of both stock and scion and how this is achieved by the matching cuts,
- the aftercare to keep the union secure, clean and moist, (but not too wet) and prevention of drying out of the cut surfaces by suitable tying materials such as tape
- the necessity for cleanliness by sterilizing tools and cleanliness of work area.

The use of the hot pipe system with targeted heating at the grafting site was only included by a few candidates.

b) The factors involved with the selection of a rootstock were for the most part clearly stated, with good examples included. Choice of stock is related to the situation and the type of tree being grown, and the most common answers related to height and vigour control particularly in relation to fruit tree rootstocks. Such as *Malus domestica* 'Discovery' grafted onto a MM106 semi dwarfing rootstock suitable for a wide range of soil types.

The importance of virus free and clonal rootstocks might have been included in more answers, and also suitability of rootstock for soil conditions, and pest and disease tolerance.



		<b>MARKS</b>
<b>Q4</b>	a) State <b>THREE</b> ways in which seedbanks can assist in conserving plant diversity.	<b>3</b>
	b) Describe the importance of provenance in conservation propagation from seed.	<b>3</b>
	c) State how maximum genetic diversity can be maintained when propagating a <b>NAMED</b> UK hedgerow species from seed.	<b>4</b>

- Q4 a)** Good answers were given by candidates who stated ways in which seedbanks can assist in the conservation of plant diversity which included conserving older cultivars, conserving endangered species, and acting as gene banks to reintroduce native species to new locations, also using the seed for research in hybridising for its potential qualities of disease or pest resistance.
- b)** On the whole, answers included relevant details on the importance of seed provenance, which is the specified area in which the seed producing plants were located or derived. However, provenance does not solely refer to the geographical location. Local conditions of micro-climate and soil type as well the ecology of other plants must be considered. Seed with appropriate provenance is used for reintroduction of a species into a site with specific matching habitat or geographic region. This promotes successful establishment through adaptation to the site conditions, and reduces introducing pest and diseases.
- c)** In this section too many candidates tended to give descriptions of the actual techniques and procedures in propagating seed raised species for hedging rather than how genetic diversity was to be maintained. Seed should be collected from a large a number of plants in the location as possible without depleting existing seed stocks and collected from a wide range of genetic variation within the species. The range should then maintain the variations desirable in the planting. It is now understood that the value of using ecologically appropriate and genetically diverse native sourced seeds is to support ecosystem recovery and long-term stability as a balance against unpredictable current and future conditions.
- Named examples of suitable UK hedgerow plant such as *Crateagus monogyna* were mostly given clearly.

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