



**R2114**

**UNDERSTANDING PROTECTED ENVIRONMENTS &  
THEIR USE IN PLANT CULTIVATION**

**Level 2**

**Tuesday 21 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

**Q1 a)** State **ONE** use for a cloche in protected cropping.

.....  
 .....  
 .....

**b)** Name **THREE** distinct cladding materials suitable for a cloche or low tunnel, giving **ONE** benefit and **ONE** limitation for **EACH** by completing the table below:

| Cladding material suitable for cloche/low tunnel | ONE benefit | ONE limitation |
|--|-------------|----------------|
| 1.   |             |                |
| 2.   |             |                |
| 3.   |             |                |

**MARKS**

**1**

**3**

**3**

**3**

Total Mark

Please see over/.....

**MARKS**

**Q2 a)** State **TWO** benefits and **TWO** limitations of growing a tomato crop in a protected structure compared with outside.

**4**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**b)** Describe how to best avoid **TWO NAMED** disorders that can damage a tomato crop.

**6**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

|            |
|------------|
| Total Mark |
|------------|

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



**MARKS**

**Q4** State the importance of **EACH** of the following terms in relation to protected cropping, giving **ONE** example of **EACH**:

- i) shape of the structure
- ii) orientation of the structure
- iii) 'damping down'
- iv) ventilation of the structure
- v) biological pest control

- 2
- 2
- 2
- 2
- 2

i) .....

.....  
.....  
.....

ii) .....

.....  
.....  
.....

iii) .....

.....  
.....  
.....

iv) .....

.....  
.....  
.....

v) .....

.....  
.....  
.....

.....  
.....

Total Mark

Please turn over/.....

**MARKS**

**Q5 a)** State **FOUR** important factors to be considered when establishing a crop of bedding plants under **EACH** of the following headings:

- i) seed sowing
- ii) pricking out

**4**  
**4**

i) .....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

ii) .....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**b)** Name **ONE** pest that may cause damage to a **NAMED** bedding plant.

**2**

.....

.....

.....

.....

|            |
|------------|
| Total Mark |
|------------|

Please see over/.....



**©These questions are the property of the Royal Horticultural Society.  
They must not be reproduced or sold.**

**The Royal Horticultural Society, Wisley, Woking, Surrey GU23 6QB.  
Charity Registration Number: 222879/SC038262**



## RHS LEVEL 2 CERTIFICATE IN THE PRINCIPLES OF GARDEN PLANNING,

### ESTABLISHMENT AND MAINTENANCE

21<sup>st</sup> JUNE 2022

|                              |            |     |                                |     |     |
|------------------------------|------------|-----|--------------------------------|-----|-----|
| <b>Candidates Registered</b> | <b>989</b> |     | <b>Total Candidates Passed</b> | 750 | 91% |
| Candidates Entered           | 827        | 84% | Passed with Commendation       | 331 | 40% |
| Candidates Absent/Withdrawn  | 138        | 14% | Passed                         | 419 | 51% |
| Candidates Deferred          | 24         | 2%  | Failed                         | 77  | 9%  |

#### 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.

## ANSWER ALL QUESTIONS

MARKS

**Q1 a)** State **ONE** use for a cloche in protected cropping.

**1**

b) Name **THREE** distinct cladding materials suitable for a cloche or low tunnel, giving **ONE** benefit and **ONE** limitation for **EACH** by completing the table below:

| Cladding material suitable for cloche/low tunnel | ONE benefit | ONE limitation |
|--|-------------|----------------|
| 1.   |             |                |
| 2.   |             |                |
| 3.   |             |                |

**3**

**3**

**3**

**Q1a)** The best candidates were able to clearly state a suitable use for a cloche and were awarded full marks. These included:

A cloche can be used to protect crops e.g. strawberries or lettuce from environmental conditions e.g. frost.

**1b)** A range of cladding materials suitable for a cloche or low tunnel, their benefits and limitations were provided by the majority of candidates who achieved maximum marks. Acceptable answers included:

| Cladding material suitable for cloche/low tunnel | ONE Benefit  | ONE Limitation  |
|--|--|---|
| 1. Polythene film                                | Cheaper than horticultural glass or polycarbonate. | Lasts only for one season.                                    |
| 2. Horticultural glass                           | Long lasting and retains heat.                     | Breaks easily which may be a Health & Safety issue.           |
| 3. Twin walled polycarbonate                     | Retains heat very well.                            | Expensive compared to polythene film and horticultural glass. |

|  | <b>MARKS</b> |
|--|--------------|
| <b>Q2 a)</b> State <b>TWO</b> benefits and <b>TWO</b> limitations of growing a tomato crop in a protected structure compared with outside.   | <b>4</b>     |
| b) Describe how to best avoid <b>TWO NAMED</b> disorders that can damage a tomato crop.  | <b>6</b>     |
| <p><b>Q2a)</b> Candidates who were able to provided both benefits and limitations of growing a tomato crop in a protected structure compared with outside gained full marks. Suitable answers included:</p> <p><b>Benefits</b></p> <ul style="list-style-type: none"> <li>• improvement in quality and yield of the tomato crop</li> <li>• longer growing season and cropping commences earlier</li> <li>• ability to use biological control methods more effectively.</li> </ul> <p><b>Limitations</b></p> <ul style="list-style-type: none"> <li>• pests and diseases can spread much more easily</li> <li>• cost of providing and controlling the environment e.g. heat, light etc.</li> <li>• essential to provide all of the water requirements for the crop.</li> </ul>  |              |
| <p><b>Q2b)</b> Candidates who had a good understanding of plant disorders that can damage a tomato crop were awarded full marks. Acceptable answers included:</p> <p><b>Blossom end rot</b></p> <p>Blossom end rot is caused by insufficient calcium in the plant tissue. This can be avoided by maintaining a balanced fertiliser status in the growing media and ensuring that the soil temperature is maintained. It is important to check the pH of the growing media prior to planting and ensure that the tomato crop is watered regularly.</p> <p><b>Cracking/Splitting of tomatoes</b></p> <p>Cracking/splitting of tomatoes is caused by erratic watering of the crop. This can be avoided by maintaining the optimum moisture content in the growing media and regular watering.</p> <p>Other plant disorders that damage tomatoes and were awarded marks include:<br/>Sunscald, Catfacing</p> |              |

|  |  | <b>MARKS</b> |
|--|--|--------------|
| <b>Q3 a)</b> State <b>THREE</b> methods by which shading can be provided for a growing crop within a protected structure.  |  | <b>6</b>     |
| b) Describe what is meant by the term 'supplementary lighting'.  |  | <b>4</b>     |
| <b>Q3a)</b> Maximum marks were achieved by candidates who stated a range of methods by which shading can be provided for a growing crop within a protected structure. These included:  |  |              |
| <ul style="list-style-type: none"> <li>• the use of shade paints to the outside of the glasshouse e.g. Redusol</li> <li>• wooden slat blinds, where the angle can be altered to provide more or less shade can be used on the outside of a glasshouse</li> <li>• shading material e.g. Netlon can be attached to the outside of a glasshouse or the glazing bars on the inside of a glasshouse.</li> </ul>   |  |              |
| <b>Q3b)</b> Many candidates had a good knowledge of what is meant by 'supplementary lighting' and gained full marks. Suitable answers included:  |  |              |
| <p>Supplementary lighting is the provision of additional lighting in addition to any natural day light in a glasshouse or polythene tunnel. It is designed to 'top up' the natural light available. The quality of the light is therefore not as critical as would be required for replacement lighting. Supplementary lighting is used when natural light is the limiting factor in photosynthesis for optimum plant growth. Low pressure sodium lights can be used as they are very light efficient.</p> |  |              |

**Q4** State the importance of **EACH** of the following terms in relation to protected cropping, giving **ONE** example of **EACH**:

- vi) shape of the structure
- vii) orientation of the structure
- viii) 'damping down'
- ix) ventilation of the structure
- x) biological pest control

2  
2  
2  
2  
2

**Q4)** The majority of candidates were able to clearly state the importance of specific terms in relation to protected cropping and were awarded full marks. Acceptable answers included:

i) **Shape of the structure**

The shape of the structure will contribute to the amount of natural light entering the structure. The greater the angle of incidence the greater the amount of light that is transmitted into the protected structure. A dome shaped or Mansard structure enables higher light transmission during the winter when the sun is naturally low in the sky.

ii) **Orientation of the structure**

Orientation is the direction in which the protected structure faces. An east/west orientation is preferable for natural light entry as it presents the most glass to the south allowing maximum light transmission. An east/west orientation is best for spring, autumn and winter and a north/south orientation is preferable for summer.

iii) **Damping down**

Damping down is the process whereby water is sprayed onto benches and paths within a protected structure to raise the level of relative humidity while at the same time reducing the air temperature.

iv) **Ventilation of the structure**

It is important to maintain the optimum growing conditions in a protected structure during warm weather by reducing the air temperature. Ventilation is important when reducing the level of relative humidity and maintaining the ambient level of carbon dioxide in a protected structure. Ventilation is also important to minimise the presence of fungal diseases affecting a growing crop.

v) **Biological pest control**

Biological pest control is the application of living predators, parasites or pathogens to control pests and diseases e.g. *Encarsia formosa* is used to control glasshouse whitefly. Biological pest control is preferable as chemicals are not used. This is better for the environment and does not kill natural predators or parasites.

**Q5 a)** State **FOUR** important factors to be considered when establishing a crop of bedding plants under **EACH** of the following headings:

- iii) seed sowing
- iv) pricking out

4  
4

b) Name **ONE** pest that may cause damage to a **NAMED** bedding plant.

2

**Q5a)** Most candidates were able to state the important factors to be considered for specific aspects when establishing a crop of bedding plants. Suitable answers included:

i) **Seed sowing**

- provision of clean (mains) water, new or clean containers and partially sterile growing media to avoid disease
- type of growing media to be used e.g. John Innes seed sowing compost which should be moisture retentive with a low nutrient status
- appropriate conditions for germination e.g. a temperature of 18-24°C, available moisture and oxygen
- method of sowing is dependent on the size of the seed e.g. large seed are space sown and medium and small seed are sown broadcast. Large and medium sized seed are normally covered. The density of sowing should be considered.

ii) **Pricking out**

- takes place at the optimum stage of seedling development i.e. cotyledons are fully expanded
- important to handle the seedling by the cotyledons/seed leaves to minimise physical damage
- growing media used e.g. J.I. No.1 to be moisture retentive but free draining with low levels of nutrients
- method of pricking out to be efficient. Selection/grading of healthy seedlings. Ensure size of hole, made using a dibber is adequate to enable the roots of the seedling not to be turned upwards. Spacing of seedlings in the tray should allow for growth. Seedlings should be gently firmed with the dibber and watered in.

**Q5b)** Candidates who named a pest that may cause damage to a specific bedding plant achieved maximum marks. Acceptable answers included:

**Pest** – aphids, capsid bug, whitefly, sciarid fly, slugs.

**Bedding plant** – *Lobelia erinus*, *Salvia splendens*, *Petunia x atkinsiana* (*Petunia x hybrida*), *Ageratum houstonianum*.

|   | <b>MARKS</b> |
|---|--------------|
| <b>Q6 a)</b> Describe <b>TWO</b> health and safety issues that need to be considered when displaying plants in a domestic building.   | <b>4</b>     |
| <b>b)</b> Describe <b>THREE</b> maintenance tasks that need to be carried out when growing <i>Kalanchoe blossfeldiana</i> in a domestic building.   | <b>6</b>     |
| <p><b>Q6a)</b> A range of health and safety issues that need to be considered when displaying plants in a domestic building were described by the best candidates who gained full marks. These included:</p> <p>Plants which have spines e.g. cacti and those with poisonous foliage must not be used or positioned where people will not brush past them.</p> <p>Plant containers must be watertight to ensure that they do not leak onto the floor and create a slip hazard.</p> <p>Plants must not be positioned where they may block an exit, especially a fire exit.</p>   |              |
| <p><b>Q6b)</b> Full marks were awarded to candidates who provided good descriptions of maintenance tasks that need to be carried out when growing <i>Kalanchoe blossfeldiana</i>. Suitable answers included:</p> <p><b>Irrigation</b> – which can be provided manually or through a drip system which could be automated. A hydroculture system could be used which will provide both water and nutrients required by the plant. The growing media must be kept moist to avoid cycles of wetting and drying.</p> <p><b>Pollution or dust</b> – occurs in areas where there is a high volume of pedestrian traffic. Dust that accumulates on the foliage must be removed with the use of a dry or slightly damp cloth to ensure that photosynthesis is not compromised.</p> <p><b>Pest and disease control</b> – Plants must be monitored on a regular basis to identify the presence of pest and disease which must be controlled. These could include pests e.g. scale insect, mealy bug which can be controlled by biological methods and diseases e.g. powdery mildew, botrytis which can be controlled by ensuring that environmental conditions are optimum.</p> |              |