



R2114

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

Level 2

Tuesday 20 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.

MARKS

Q2 Describe the establishment of a crop of bedding plants under **EACH** of the following headings:

- i) seed sowing;
- ii) germination environment;
- iii) pricking out.

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Total Mark

Please turn over/.....

MARKS

Q3 Describe **TWO** effects on plant growth for **EACH** of the environmental factors listed, by completing the table below.

Environmental Factors	Effects on plant growth	
Good air movement	1. 2.	2
High natural light	1. 2.	2
High relative humidity	1. 2.	2
Erratic irrigation	1. 2.	2
Carbon dioxide concentration	1. 2.	2
		Total Mark

Please see over/.....

MARKS

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

- i) framework material;
- ii) orientation;
- iii) supplementary lighting;
- iv) cladding material;
- v) shape of structure.

- 2**
- 2**
- 2**
- 2**
- 2**

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Total Mark

Please turn over/.....

MARKS

Q5 Describe the production of *Kalanchoe blossfeldiana* under **EACH** of the following headings:

- i) potting and re-potting;
- ii) watering;
- iii) feeding;
- iv) control of **ONE NAMED** pest.

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Total Mark

Please see over/.....

MARKS

Q6 State **ONE** distinct benefit and **ONE** distinct limitation of **EACH** of the following materials used for plant production containers, by completing the table below.

Materials	Benefits	Limitations	
Terracotta			2
Plastic			2
Polystyrene			2
Peat			2
Paper			2
			Total Mark

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

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

Level 2

Tuesday 20 June 2017

Candidates Registered	751		Total Candidates Passed	529	85.88%
Candidates Entered	616	82.02%	Passed with Commendation	206	33.44%
Candidates Absent/Withdrawn	122	16.25%	Passed	323	52.44%
Candidates Deferred	13	1.73%	Failed	87	14.12%

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.

- 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) List **FOUR** distinct protective structures used in horticulture.

2

b) Describe **ONE** distinct horticultural use for **EACH** of the structures listed in a).

8

Q1a) The majority of candidates listed a range of protective structures used in horticulture and gained full marks. These were; greenhouse, cold frame, polythene tunnel, cloche and conservatory.

Q1b) Candidates who provided detailed descriptions of the protective structures were awarded full marks. Acceptable answers included:

Greenhouse is used for the propagation and production of a long main season crop of tomatoes or for the production of a cut flower crop.

Cold Frame is used for the propagation and production of young vegetable crops e.g. cabbage and for hardening off bedding plants.

Polythene Tunnel is used for growing a self-blanching celery crop or for the production of a crop of lettuce.

Cloche is used to advance ripening of crops e.g. strawberries or for covering taller crops to get them established.

Conservatory is used to display flowering or foliage pot plants for the home.

Q2 Describe the establishment of a crop of bedding plants under **EACH** of the following headings:

- | | | |
|------|--------------------------|----------|
| i) | seed sowing; | 4 |
| ii) | germination environment; | 3 |
| iii) | pricking out. | 3 |

Q2) The best candidates provided detailed descriptions of the specific stages involved in the establishment of a crop of bedding plants and gained maximum marks. Acceptable answers included:

- i) **Seed Sowing** – Small seed can be sown broadcast in a seed tray whereas large seed can be space sown in a seed tray or sown in modules. Seed trays are overfilled with a seed sowing growing media and firmed with a presser board to create a firm, level seed bed. Seed is broadcast evenly at a suitable density and lightly covered with growing media as appropriate.
- ii) **Germination Environment** – Seeds require moisture, oxygen and warmth to germinate which can be provided by well aerated but moisture retentive seed sowing growing media and a temperature of 18-18°C in a greenhouse or growing room.
- iii) **Pricking Out** – is carried out once the cotyledon leaves have expanded and can be handled without damage. The seedlings are teased apart with a dibber and pricked out into seed trays, modules or small pots containing a suitable growing media e.g. John Innes No.1. A hole, large enough to accommodate the root system of the seedling is made using a dibber and to a depth so that the cotyledon leaves sit just above growing media level.

Q3 Describe **TWO** effects on plant growth for **EACH** of the environmental factors listed, by completing the table below.

Environmental Factors	Effects on plant growth	
Good air movement	1. 2.	2
High natural light	1. 2.	2
High relative humidity	1. 2.	2
Erratic irrigation	1. 2.	2
Carbon dioxide concentration	1. 2.	2

Q3) To gain full marks candidates were required to describe the effect on plant growth of specific environmental factors. Suitable answers included:

Environmental Factor	Effect on Plant Growth
Good air movement	Sturdier growth. Less prevalence of disease.
High natural light	Compact healthy growth with short internodes. Good bud initiation and flower development.
High relative humidity	Higher incidence of disease. Less water loss, reduced irrigation required.
Erratic irrigation	Possible splitting or damage to fruit production. Possible leaf damage caused by leaf scorch or root loss.
Carbon dioxide concentration	If concentration of carbon dioxide is good rate of photosynthesis will increase. Higher level of crop productivity.

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

- | | | |
|------|-------------------------|----------|
| i) | framework material; | 2 |
| ii) | orientation; | 2 |
| iii) | supplementary lighting; | 2 |
| iv) | cladding material; | 2 |
| v) | shape of structure. | 2 |

Q4) Most candidates were able to state the importance of specific aspects in relation to protected cropping. Acceptable answers included:

- i) **Framework Material** – this needs to provide strength as it is the skeleton of the structure. This can be made from wood e.g. red cedar or teak. Metal can also be used e.g. steel which can be dipped in zinc to protect it from corrosion i.e. galvanised.
- ii) **Orientation** – this is the way in which the structure is aligned in relation to the points of the compass. An East/West orientation is most desirable as it will present the maximum amount of glass to the sun and will maximise natural light entry which is especially important in the winter months.
- iii) **Supplementary Lighting** – is artificial lighting which is used within a protected structure to supplement the natural daylight available within the structure. A range of lights can be used e.g. high pressure sodium or metal halide lamps.
- iv) **Cladding Material** – this is the material that covers the sides and roof of the structure. It is attached to and covers the framework of the structure e.g. horticultural glass or polycarbonate.
- v) **Shape of Structure** – this will affect access by people and machinery as well as natural light transmission especially during the winter months. A mansard shape which has a roof in two stages and sloping sides will provide the best angle for light transmission. If light strikes the glass at an angle of 90°, 90% of the light will be transmitted.

Q5 Describe the production of *Kalanchoe blossfeldiana* under **EACH** of the following headings:

- | | | |
|------|-----------------------------------|----------|
| i) | potting and re-potting; | 4 |
| ii) | watering; | 2 |
| iii) | feeding; | 2 |
| iv) | control of ONE NAMED pest. | 2 |

Q5) Many candidates described the specific aspects of the production of *Kalanchoe blossfeldiana* and were awarded full marks. Suitable answers included:

- i) **Potting and Re-Potting** – plants are potted into 9cm pots when they are rooted using a growing media e.g. John Innes No.1. All pots and media need to be sterile and plants should be graded and any damaged material removed. The plant should be potted upright in the centre of the pot to a level just above the top of the roots and firmed. Re-potting into e.g. a 1 litre pot using John Innes No.2 will take place once the plant roots have filled the original pot. A multi-purpose growing media would also be suitable.
- ii) **Watering** – will be required when the potted plant is light when lifted or the growing media has shrunk away from the edges of the pot. The plant can be watered overhead or by capillary watering moderately during the growing season and just kept moist during the winter.
- iii) **Feeding** – is required to ensure that the plant has an adequate supply of nutrients for growth e.g. nitrogen, phosphorus and potassium. This can be provided by the inclusion of a compound controlled release fertiliser in the growing media or applied as a liquid feed through the irrigation system.
- iv) **Control of One Named Pest** – e.g. aphids or mealy bug can be controlled by the use of soft soap or by the practice of good crop hygiene and providing optimum cultural conditions for the plant.

Q6 State **ONE** distinct benefit and **ONE** distinct limitation of **EACH** of the following materials used for plant production containers, by completing the table below.

Materials	Benefits	Limitations
Terracotta		
Plastic		
Polystyrene		
Peat		
Paper		

2
2
2
2
2

Q6) A range of benefits and limitations of specific materials used for plant production containers were stated by many candidates who gained maximum marks. These included:

Materials	Benefits	Limitations
Terracotta	Heavy material compared to plastic which provides stability.	It is expensive compared to plastic.
Plastic	Durable, long lasting and available in many different colours.	Watering is more critical as the material is impervious.
Polystyrene	Very light in weight. White in colour reflecting light back onto the plant.	Very fragile and can be damaged very easily.
Peat	Natural material. Pot can be plunged into soil to avoid root disturbance at planting stage.	Limited use (once only). Non eco-friendly material.
Paper	Inexpensive compared to all other materials.	Very short term use.
