



**RHS LEVEL 3 ADVANCED/DIPLOMA IN HORTICULTURE  
WRITTEN EXAMINATION**

**10:00am Wednesday 6<sup>th</sup> July 2011**

**MODULE D**

**Outdoor Plant Production  
Protected Plant Production**

**Section A – Short Answer Questions**

Candidate Number:.....

Candidate Name:.....

Centre Number/Name:.....

**IMPORTANT – Please read carefully before commencing.**

- i) The duration of the papers in Module **D** is **2 hours**.
- ii) Answer **ALL** questions in Section **A**.
- iii) **ALL** questions in Section **A** carry equal marks.
- iv) Write your answers legibly in the spaces provided.
- v) Use **METRIC** measurements **ONLY**.
- vi) Where plant names are required, they should include genus, species and where appropriate cultivar.

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

## ANSWER ALL QUESTIONS

### MARKS

- Q1** State **FOUR** soil factors that would need to be considered when selecting a site for producing cut flowers.

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- Q2** List **TWO** advantages and **TWO** limitations of container grown nursery stock compared with open grown plants.

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- Q3** State **TWO** limitations of growing a **NAMED** tree fruit on a dwarfing root stock.

2

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**ANSWER ALL QUESTIONS**

		<b>MARKS</b>
<b>Q4</b>	Identify <b>ONE</b> type of mechanical harvester used for <b>EACH</b> of the following crops:  a) tree fruit; b) soft fruit.	<b>2</b>
	..... ..... ..... ..... .....	
<b>Q5</b>	Name <b>TWO</b> systems of outdoor irrigation for a <b>NAMED</b> flower crop.	<b>2</b>
	..... ..... ..... ..... .....	
<b>Q6</b>	List <b>FOUR</b> factors that influence the spacing of open grown trees in a nursery situation.	<b>2</b>
	..... ..... ..... ..... .....	
<b>Q7</b>	State <b>ONE</b> biological control for a <b>NAMED</b> pest on a <b>NAMED</b> pot plant.	<b>2</b>
	..... ..... ..... ..... .....	

## ANSWER ALL QUESTIONS

### MARKS

- Q8** State **FOUR** essential characteristics of a modern glasshouse ventilation system.

2

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- Q9** State **TWO** limitations of the use of Nutrient Film Techniques for the production of tomatoes.

2

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- Q10** State **TWO** limitations on the use of farmyard manure (FYM) in organic systems.

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**MODULE D**

**Outdoor Plant Production  
Protected Plant Production**

**Sections B & C - Structured Questions**

**IMPORTANT – Please read carefully before commencing.**

- i) The duration of the papers in Module **D** is **2 hours**.
- ii) Answer **TWO** questions from Section **B** and **ONE** question from Section **C**.
- iii) **ALL** questions carry equal marks.
- iv) Write your answers legibly in the answer booklets provided.
- v) Use **METRIC** measurements **ONLY**.
- vi) Where plant names are required, they should include genus, species and where appropriate cultivar.

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

## Section B – Outdoor Plant Production

Answer **TWO** questions from this section

		MARKS
<b>Q11</b>	a) Outline the EU grading requirements for <b>ONE</b> of the following:  i) strawberries; ii) a <b>NAMED</b> tree fruit.	  <b>5</b>
	b) State the advantages and limitations of grading produce according to EU standards.	<b>5</b>
	c) Identify the factors in the production and harvesting of the crop identified in a), that can reduce the yield of top class fruit.	<b>10</b>
 <b>Q12</b>	 Prepare a plan for the production of a <b>NAMED</b> shrub grown in containers for sale through a garden centre using <b>EACH</b> of the following headings:  i) propagation and establishment in containers for sale; ii) managing water and nutrients; iii) pest and disease management; iv) preparation for marketing.	    <b>5</b> <b>5</b> <b>5</b> <b>5</b>

Please see over/.....

**Q13** a) Explain how the storage of harvested material is influenced by plant physiology. **5**

b) Describe, using **NAMED** examples how outdoor salad crops are managed to optimise their storage life and marketability under **EACH** of the following headings:

- |      |  |          |
|------|--|----------|
| i)   | pre-harvesting, during harvesting and transport; | <b>5</b> |
| ii)  | storage;   | <b>5</b> |
| iii) | handling, packing, transporting and selling.     | <b>5</b> |

**Q14** Describe, under **EACH** of the following headings, the main considerations when equipping a packhouse to deal with a **NAMED** vegetable crop for storage and marketing:

- |      |                               |          |
|------|-------------------------------|----------|
| i)   | site requirements;            | <b>6</b> |
| ii)  | range of equipment;           | <b>6</b> |
| iii) | general facilities;           | <b>5</b> |
| iv)  | adaptability for other crops. | <b>3</b> |

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

## Section C – Protected Plant Production

Answer **ONE** question only from this section

		MARKS
<b>Q15</b>	a) State <b>FIVE</b> important factors that need to be considered when preparing protected crops for marketing.	<b>5</b>
	b) Evaluate <b>FIVE</b> alternative marketing outlets for protected crops.	<b>15</b>
<b>Q16</b>	Describe the production under protection of a <b>NAMED</b> bedding plant using <b>EACH</b> of the following headings:	
	i) propagation and planting;	<b>5</b>
	ii) routine maintenance;	<b>5</b>
	iii) preparation for marketing;	<b>5</b>
	iv) the symptoms and control methods for <b>ONE NAMED</b> pest and <b>ONE NAMED</b> disease.	<b>5</b>

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## RHS LEVEL 3 ADVANCED/DIPLOMA IN HORTICULTURE WRITTEN EXAMINATION

10:00am Wednesday 6<sup>th</sup> July 2011

### MODULE D

#### Outdoor Plant Production Protected Plant Production

<b>Candidates Registered</b>	<b>12</b>		<b>Total Candidates Passed</b>	<b>8</b>	<b>88.89%</b>
Candidates Entered	9	75.0%	Passed with Commendation	0	-
Candidates Absent	2	16.67%	Passed	8	88.89%
Candidates Deferred	0	-	Failed	1	11.11%
Candidates Withdrawn	1	8.33%			

#### Section A – Short Answer Questions

- Q1** State **FOUR** soil factors that would need to be considered when selecting a site for producing cut flowers.

Marks were awarded for any of the following: drainage, pH, nutrient levels, windbreaks and previous cropping. Most candidates gave correct answers. Marks were lost for duplication – “good drainage and absence of water logging”.

- Q2** List **TWO** advantages and **TWO** limitations of container grown nursery stock compared with open grown plants.

The advantages were easier to use controlled release fertiliser, easier to inspect progress and root development and all year round sales. The limitations were marketing costs greater and extra facilities for production required. Candidates were usually able to give correct advantages and limitations.

- Q3** State **TWO** limitations of growing a **NAMED** tree fruit on a dwarfing root stock.

The majority of candidates selected apples as their named fruit and gave a correct root stock. Limitations included the need to support the tree throughout its life, provide good growing conditions and keep weeds under control.

**Q4** Identify **ONE** type of mechanical harvester used for **EACH** of the following crops:

- a) tree fruit;
- b) soft fruit.

Candidates were required to simply name two suitable harvesters e.g. for tree fruit, an apple shaker and for soft fruit, a straddle trailer for blackcurrants.

Most candidates failed this question; several did not attempt the question and were generally unfamiliar with the subject.

**Q5** Name **TWO** systems of outdoor irrigation for a **NAMED** flower crop.

Low level irrigation, seep hose and over head spray lines were accepted with a suitable flower crop to gain full marks. The use of a hosepipe was not accepted as a system. Some unsuitable flowers were named e.g. a climbing tree rose.

**Q6** List **FOUR** factors that influence the spacing of open grown trees in a nursery situation.

Several factors could be selected including customer specification, size and age at lifting, equipment used during the production and harvesting. All candidates attempted this question and were able to list some factors, but some had difficulty in listing four.

**Q7** State **ONE** biological control for a **NAMED** pest on a **NAMED** pot plant.

Some candidates did not attempt this question and one failed to name a pot plant. The correct control of either whitefly or red spider mite were the most popular selections.

**Q8** State **FOUR** essential characteristics of a modern glasshouse ventilation system.

Candidates gaining full marks included; easy to operate, quick response to temperature change, fully automatic and computer controlled. Marks were lost for failing to appreciate that the question referred to modern systems and a number of outdated characteristics were included in the answers.

**Q9** State **TWO** limitations of the use of Nutrient Film Techniques for the production of tomatoes.

Most candidates gained full marks for correctly stating the need for specialist equipment and high technical knowledge compared with traditional methods of production. They appreciated that precision was required when measuring nutrient levels.

**Q10** State **TWO** limitations on the use of farmyard manure (FYM) in organic systems.

The question was answered well and candidates appreciated the need to meet the organic standards, the availability of the material and the possible expense including delivery.

## Structured Questions

### Section B – Outdoor Plant Production

- Q11** a) Outline the EU grading requirements for **ONE** of the following:
- i) strawberries;
  - ii) a **NAMED** tree fruit.
- b) State the advantages and limitations of grading produce according to EU standards.
- c) Identify the factors in the production and harvesting of the crop identified in a), that can reduce the yield of top class fruit.

This question was popular with candidates, being answered by 67% of the entry.

Candidates gaining good marks in the first part of the question were those who were able to demonstrate that they had read and understood the EU standards. Marks were available for stating the basic standards that apply to all produce e.g. intact, sound, fair marketable quality, country of origin, practically free of blemish, damage etc (many candidates stated that produce must be absolutely free from blemish etc, this is incorrect and lost marks). Further marks were for the crop-specific requirements of size, quality, labelling and packaging. Surprisingly few candidates scored top marks as knowledge was always patchy.

Most candidates scored well on the second section. They gained marks because they were able to demonstrate that there are distinct advantages to packing to EU standards. Few identified the regulatory requirement and avoidance of sanction.

Answers to the third part of the question were mixed. There is a wide range of factors affecting storage. Candidates who could identify a wide range of factors such as site and soil, management of vegetation, water, nutrient and pests and diseases scored good marks. Some lost marks by giving a great deal of detail on a small number of these factors. The harvesting section required knowledge of larger scale operations and mechanisation. Candidates scored good marks for accuracy, for instance stating the technique for picking apples by lifting and twisting then placing in a picking bag, rather than just stating "being careful when picking apples".

**Q12** Prepare a plan for the production of a **NAMED** shrub grown in containers for sale through a garden centre using **EACH** of the following headings:

- i) propagation and establishment in containers for sale;
- ii) managing water and nutrients;
- iii) pest and disease management;
- iv) preparation for marketing.

This question was tackled by 33% of candidates. Some answers were very good but some very poor. As usual in this unit, the candidates who could demonstrate first-hand knowledge of the production industry and a working knowledge of nursery stock production were able to score good marks.

Most candidates showed good knowledge of propagation. Candidates gaining good marks in this question were those who could relate this to commercial scale production. Good answers identified the process in logical sequence and included timing, source of material, method, propagation facility and choice of media and containers, labelling and potting on.

Getting good marks in the second part of the question required understanding the processes of nursery stock production. Candidates gained good marks for showing how a nursery would meet the needs of the plant to ensure consistent growth such as the type of watering system, the nutrient content of growing media and the limited use of additional nutrient applied in the longer term.

Candidates gaining good marks identified likely pests and diseases, the need for monitoring and control linked to integrated management systems. The rest of the marks were gained by identifying cultural methods such as choice of variety and timing, managements of the growing environment and finally the use of pesticides, quoting the specific application.

Candidates needed to be aware of the specific needs of marketing through a garden centre. Some candidates seemed to have forgotten the question by this part and made reference to selling through other outlets. Good marks were gained by including the timing of selling (e.g. when in bloom), grading for uniformity, labelling including bar-codes and pricing, stacking on unit loads and transport.

- Q13** a) Explain how the storage of harvested material is influenced by plant physiology.
- b) Describe, using **NAMED** examples how outdoor salad crops are managed to optimise their storage life and marketability under **EACH** of the following headings:
- i) pre-harvesting, during harvesting and transport;
  - ii) storage;
  - iii) handling, packing, transporting and selling.

Only 33% of candidates tackled this question. It was not very well answered with few high marks and some very low.

Good marks were available for demonstrating a basic understanding of how plant tissue responds to being removed from the growing plant. This included explaining about respiration rate, loss of moisture and impact of pest or disease and links to the crop stage, temperature and type of crop. Many candidates seemed almost to think that controlling ethylene was of primary importance, instead of just a part of the equation.

There was an obvious choice of crops quoted in the second part of the question. Field grown lettuce (in particular iceberg lettuce) was the prime choice; most of the question could be answered well by selecting that one crop and making references to others as appropriate. Surprisingly few candidates did so. Many made answering the question difficult by referring to slightly unusual crops such as leafy salads. The main problem is that they are not commercialised and have less technology applied to them. They have a very short shelf-life so it was difficult write much about their storage. The key words were in the question – “during harvest and transport” and “packing, handling and selling”. It needed a crop that underwent these processes. Candidates who spotted this scored well.

To get good marks in the pre-harvest section, the candidates should have identified the growing conditions, choice of variety, timing (it needed more than “only cut when it is cool”, commercial growers don’t have that luxury), use of equipment, handling and transport.

There was a lot of material relevant to the storage section. It clearly links to both parts i) and iii) and removal of field heat could be discussed in any part of them. Good marks were available for identifying short and medium term storage (long-term does not really apply to salad crops) and the conditions that would prolong shelf life and safeguard quality. Good candidates could identify the limits of storage.

In the last section, marks were available for identifying how the crop develops/degrades in storage, how the stored crop is prepared and transported for marketing. The best answers showed how the crop continues through the supply chain and into the retail outlet.

**Q14** Describe, under **EACH** of the following headings, the main considerations when equipping a packhouse to deal with a **NAMED** vegetable crop for storage and marketing:

- i) site requirements;
- ii) range of equipment;
- iii) general facilities;
- iv) adaptability for other crops.

This question was tackled by 67% of candidates. Some scored very good marks by showing a knowledge of how commercial pack-houses work, presumably as a result of first-hand experience.

Some candidates fell at the first fence by identifying and describing the packing facilities for a crop that is not a vegetable (e.g. fruit and salad crops).

Most candidates gained reasonable marks for the site requirements section. Good marks went to the candidates who identified the facility, listing and explaining the need for access to the cropping area, roads for transport of crops and utilities. Some identified topographic issues such as a size, shape and slope. Few identified the legal requirements for planning and discharge restrictions.

Candidates with knowledge of working pack-houses were able to answer the equipment section succinctly and get good marks. Marks were gained for identifying the equipment likely to be used in the various stages of the pack-house process i.e. how the crop is received, cleaning processes, washing, selection for quality, size grading and packing or boxing.

Most candidates scored quite well on the general facilities section. They identified the welfare and administrative facilities that are required. A few got marks for listing storage (other than crop storage), waste handling or first aid and health and safety facilities.

This final part of the question required a wider working knowledge of the subject. Successful candidates stated which crops could be processed with a minimum of changes (e.g. carrot lines being used for parsnips or washed potatoes). They got marks for identifying what changes would need to be made. Marks were available for identifying crops that could be handled with a bit more adaptation or additional equipment (the equipment needed to be identified). Marks were not given to candidates who identified crops that required a building, but where there was no compatibility between the crops e.g. onions (a crop that requires clean dry packing conditions) and leeks (that are basically a wet crop).

## Section C – Protected Plant Production

- Q15** a) State **FIVE** important factors that need to be considered when preparing protected crops for marketing.
- b) Evaluate **FIVE** alternative marketing outlets for protected crops.

Candidates had a good understanding of the factors that are important when preparing crops for marketing. Marks were lost through insufficient detail in the statements which meant that it was in some cases difficult to be sure what the candidate was trying to include.

Candidates had a good appreciation of the range of marketing opportunities open to the grower. Some answers focussed rather on markets and included several types of market including Farmers Markets as well as more traditional markets. Other candidates included a much wider range of marketing opportunities such as Pick Your Own and the Internet. Again some of the answers lacked detail with candidates perhaps focussing on the advantages of a particular outlet rather than giving a more balanced view and including many of the disadvantages. In some cases candidates provided a short sentence stating a particular aspect of that particular marketing opportunity but no detail on the possible impact of this to the grower.

**Q16** Describe the production under protection of a **NAMED** bedding plant using **EACH** of the following headings:

- i) propagation and planting;
- ii) routine maintenance;
- iii) preparation for marketing;
- iv) the symptoms and control methods for **ONE NAMED** pest and **ONE NAMED** disease.

Candidates all named an appropriate bedding plant, however many of the answers lacked detail and marks were lost because of it. For example the phrases 'select an appropriate seed compost' or 'provide optimum temperatures for germination' were used by several candidates. This was instead of stating the bulky ingredients of a suitable seed germination media or giving a temperature range suitable for the germination of the particular bedding plant chosen by the candidate. When applying the test 'could I have successfully propagated these plants based on the information provided by the candidate?' in most cases the answer was no.

Most of the main routine operations were included by candidates answering the second part of the question. Some were overlooked. Few mentioned the importance of hygiene and how a grower might avoid unwanted weed growth if trays were on the ground. The lack of relevant detail was the main reason for lost marks with candidates making very general statements about routine maintenance. There was some confusion as to whether this was the maintaining of plants in trays prior to planting or the maintaining of plants already planted in bedding displays.

The third section of the question attracted the briefest answers. Most if not all of the candidates included watering and the removal of any old flowers, some stated that any weeds present in the pots or trays should be removed. Very few if any mentioned the importance of labelling and the affect that can have on effective marketing.

The final section of the question was well answered, with all candidates naming suitable pests and diseases. Symptoms of attack were in general well known with candidates providing some detailed features on which a positive identification could easily have been made. It was refreshing to see candidates including preventative measures as part of their control strategy.

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