



RHS LEVEL 3 ADVANCED/DIPLOMA IN HORTICULTURE WRITTEN EXAMINATION

10:00am Wednesday 10th February 2010

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 **TWO** advantages of using rootstocks in the preparation of fruit trees.

2

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Q2 State what is meant by the term 'shelf life'.

2

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Q3 List **FOUR** routine operations necessary for the successful maintenance of an area of nursery stock bed.

2

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Q4 List **FOUR** important aspects of pruning top fruit.

2

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Please see over/.....

ANSWER ALL QUESTIONS

MARKS

- Q5** Name **TWO** different protected cropping structures and outline **ONE** use of **EACH** of the structures named.

2

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- Q6** State what is meant by the term 'glasshouse orientation'.

2

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- Q7** List **FOUR** reasons why crop rotation is an important consideration when crop planning.

2

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- Q8** Explain the benefits of the 'bed system' of vegetable production with reference to **TWO NAMED** crop examples.

2

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Please turn over/.....

ANSWER ALL QUESTIONS

MARKS

- Q9** Name **FOUR** distinct methods of vegetative propagation used in shrub production, giving a **NAMED** plant example for each.

2

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- Q10** List **FOUR** distinct methods of growing tomatoes under protection and give **ONE** advantage of **EACH** system.

2

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RHS LEVEL 3 ADVANCED/DIPLOMA IN HORTICULTURE WRITTEN EXAMINATION

10:00am Wednesday 10th February 2010

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

Q11 Describe the production of a **NAMED** container grown shrub under **EACH** of the following headings:

- | | | |
|------|----------------------|----------|
| i) | propagation; | 4 |
| ii) | nutrition; | 4 |
| iii) | irrigation; | 4 |
| iv) | pests and diseases; | 4 |
| v) | mechanised handling. | 4 |

Q12 Explain how the quality and shelf life of **EITHER** strawberries **OR** a **NAMED** allium are affected by **EACH** of the following headings:

- | | | |
|------|--|-----------|
| i) | cultivar; | |
| ii) | growing medium; | |
| iii) | environmental conditions; | |
| iv) | husbandry; | |
| v) | harvesting and post harvest treatment. | 20 |

Q13 Describe the production of a **NAMED** cut flower crop under **EACH** of the following headings:

- | | | |
|------|--------------------------------|----------|
| i) | propagation and establishment; | 4 |
| ii) | irrigation; | 4 |
| iii) | pest and disease control; | 4 |
| iv) | weed control; | 4 |
| v) | harvesting. | 4 |

Q14 Differentiate between **EACH** of the following techniques of nursery stock production:

- | | | |
|------|------------------|----------|
| i) | container grown; | 8 |
| ii) | containerised; | 4 |
| iii) | open ground. | 8 |

Please see over/.....

Section C – Protected Plant Production

Answer ONE question only from this section

		MARKS
Q15	a) Name and describe THREE distinct methods by which a grower can determine when to water a plant growing in a container.	6
	b) Compare EACH of the methods listed in a), by tabulating their advantages and limitations.	6
	c) Describe how plant nutrients can be introduced into an irrigation system for liquid feeding.	8
Q16	Describe the production of bedding plants under EACH of the following headings:	
	i) risk assessment;	5
	ii) propagation and establishment;	5
	iii) crop development and maintenance;	5
	iv) control of pests and diseases.	5

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MODULE D

Outdoor Plant Production Protected Plant Production

Candidates Registered	26		Total Candidates Passed	10	47.62%
Candidates Entered	21	80.77%	Passed with Commendation	0	-
Candidates Absent	0	-	Passed	10	47.62%
Candidates Deferred	5	19.23%	Failed	11	52.38%
Candidates Withdrawn	0	-			

Section A – Short Answer Questions

Q1 State **TWO** advantages of using rootstocks in the preparation of fruit trees.

Most candidates were able to give two valid advantages, some candidates correctly named specific rootstocks for the control of vigour. Some top fruit will not root easily others are prone to root problems.

Q2 State what is meant by the term 'shelf life'.

Candidates provided a wide range of answers. Most understood the meaning of "shelf life". The time remaining in optimum condition and suitable for consumption was generally well understood.

Q3 List **FOUR** routine operations necessary for the successful maintenance of an area of nursery stock bed.

Good candidates' answers listed the need to control weeds, maintain nutritional levels, control pests and diseases, relevant pruning and irrigation.

Q4 List **FOUR** important aspects of pruning top fruit.

Candidates were familiar with the pruning of top fruit and appreciated the importance of removing diseased, dead and damaged wood to ensure good open trees. Time of year, tree shape and growing systems were also included in good candidate answers.

Q5 Name **TWO** different protected cropping structures and outline **ONE** use of **EACH** of the structures named.

Some candidates lost marks as they appeared to be unfamiliar with the 'term protected cropping structures'. Some candidates provided examples of actual equipment used for production in structures. A range of glasshouse types, polythene tunnels and frames were acceptable. A whole range of systems and crops were given as examples. Cloches are now rarely used in commerce.

Q6 State what is meant by the term 'glasshouse orientation'.

This basically required the sighting of structures in relation to the points of the compass. Candidates accurately specified the longest sides running North to South or East to West for structures. An East – West orientation for winter light. Some candidates stressed correctly that in large Venlo blocks that orientation was not as important as with single span structures.

Q7 List **FOUR** reasons why crop rotation is an important consideration when crop planning.

Marks were awarded for a range of accurate reasons including pest and disease control, helping to maintain fertility. The control of weeds and allowing areas to be cultivated to a relevant depth was an important point to consider.

Q8 Explain the benefits of the 'bed system' of vegetable production with reference to **TWO NAMED** crop examples.

Several candidates were unfamiliar with the 'bed system' and concentrated on rotation. The importance of reduced compaction, better use of land, more uniform crops and fertile soil were the main points required. Marks were lost where fruit and herbaceous plants were given as examples.

Q9 Name **FOUR** distinct methods of vegetative propagation used in shrub production, giving a **NAMED** plant example for each.

Shrub species were required to indicate specific methods. Marks were awarded for distinct methods – specific types of cuttings including hardwood and leaf bud; budding and layering. Marks were lost for wrong examples, common incorrect answers included herbaceous perennials.

Q10 List **FOUR** distinct methods of growing tomatoes under protection and give **ONE** advantage of **EACH** system.

Growing methods were not fully appreciated by many candidates. The answer required examples of Growbags, Rockwool, Borders soils and Nutrient Film techniques – the advantages of these systems were clearly understood in terms of price, water conservation, different and nutritional requirements by candidates who were awarded higher marks.

Structured Questions

Section B – Outdoor Plant Production

Q11 Describe the production of a **NAMED** container grown shrub under **EACH** of the following headings:

- i) propagation;
- ii) nutrition;
- iii) irrigation;
- iv) pests and diseases;
- v) mechanised handling.

This question was popular with candidates, and was answered by 77% of candidates. Candidates gaining good marks in this question were those who were able to demonstrate that they had knowledge of nursery stock production arising from time spent in the industry. Regrettably many candidates lost marks because they could not relate their plant knowledge to commercial practice.

- i) Propagation
Most candidates demonstrated a good knowledge of propagation methods and aftercare. Candidates who showed how this would work in practice gained higher marks.
- ii) Nutrition
Candidates showed good knowledge for the need of nutrition. Few candidates noted the contribution of the nutrient content of the growing media to plant growth. There is considerable confusion between “controlled release” and “slow-release” fertilisers and how it is used by inclusion in growing media (as opposed to being added later).
- iii) Irrigation
Good marks were awarded to candidates who were able to identify appropriate methods and how it is used. Few candidates identified how irrigation requirements and applications changed with season, weather and growth stage.
- iv) Pests and diseases
Most candidates earned marks for listing common pests and diseases and the need and method of control. Few candidates described symptoms or crop-specific problems.
- v) Mechanisation
This section was not answered well. Some candidates showed knowledge of the existence of potting machinery, but few could accurately describe the equipment, its role in the production process or the benefits of its use. Mechanisation of handling was mentioned but not fully described.

Q12 Explain how the quality and shelf life of **EITHER** strawberries **OR** a **NAMED** allium are affected by **EACH** of the following headings:

- i) cultivar;
- ii) growing medium;
- iii) environmental conditions;
- iv) husbandry;
- v) harvesting and post harvest treatment.

The majority of candidates attempting this question chose strawberries rather than Allium crops. Most candidates showed knowledge of outdoor grown crops but did not make reference to the use of protection to extend season or improve quality and yield. Candidates gaining higher marks in this question were those who were able to demonstrate that they had knowledge of production. Regrettably many candidates lost marks because they could not relate their plant knowledge to commercial practice.

- i) Cultivars
Most candidates gained marks for identifying the impact of variety on quality, but did not identify the characteristics that are regarded as “quality”. Few candidates related choice of variety to production system and season.
- ii) Growing media
Candidates earned marks for showing how soils were managed for strawberry production. Having not identified the range of methods (e.g. grow-bags, raised tables, hydroponics) candidates lost marks because they did not discuss these.
- iii) Environmental
Candidates found it difficult to put much detail into this because they were only relating to outside production. They were awarded marks for showing how conditions depend on site and how it is managed by choice of site, shelter belts etc. Opportunities to gain marks by describing how the use of protection can compliment the environment were lost by the majority of candidates.
- iv) Husbandry
Most candidates gained marks by identifying production techniques in the outdoor crop and impact of weeds, pests and diseases and their control. Candidates lost marks by not demonstrating knowledge of use of pesticides, or clear use of IPM.
- v) Harvesting
Candidates gained marks by showing how strawberries are selectively picked by hand. They correctly identified the need to pick under cool and dry conditions. Candidates lost marks by focusing post harvest treatments towards “storage” rather than avoiding deterioration prior to sale of this very perishable crop. Few candidates mentioned selection criteria and the influence of packaging on avoidance of damage.

Q13 Describe the production of a **NAMED** cut flower crop under **EACH** of the following headings:

- i) propagation and establishment;
- ii) irrigation;
- iii) pest and disease control;
- iv) weed control;
- v) harvesting.

Candidates showed good knowledge of growing plants for cut flower production, but failed to relate it to production for commercial use either in the field or under protection.

- i) Propagation and establishment
Candidates gained good marks by demonstrating knowledge of propagation and some of the techniques for establishment and growing on. No candidate used the opportunity to use a time-line to show the sequence of operations. Candidates lost marks for not having a clear picture of the production process and the management of the crop and its environment.
- ii) Irrigation
Good marks were earned by candidates who were able to identify appropriate methods and how it is used. Few candidates identified how irrigation requirements and applications changed with season, weather and growth stage.
- iii) Pest and diseases
Candidates earned good marks by showing knowledge of the range of common pests and diseases that impact on plant production. Candidates who demonstrated a knowledge of a range of control methods (although did not always draw the links between them), gained higher marks. Candidates lost marks by not showing knowledge of crop-specific pests and diseases and on some occasions used inappropriate examples.
- iv) Weeds
Most candidates gained good marks by showing how perennial weeds were eliminated prior to planting. Marks were lost because candidates did not address annual weeds either in the seed-bed (e.g. by sterilisation or use of clean growing media) or by germinating during the production process. Poor knowledge of the use of herbicides was apparent.
- v) Harvesting
Most candidates gained good marks by identifying harvest techniques and timings. Some marks were gained by discussing how flowers are treated but most missed on the single most important point – i.e. storing them in water. Grading and packing was generally not described.

Q14 Differentiate between **EACH** of the following techniques of nursery stock production:

- i) container grown;
- ii) containerised;
- iii) open ground.

This question provided the experienced candidate the opportunity to score high marks. Some candidates did this but others fared less well because they did not have a clear understanding of the differences between the methods, often spending time struggling to explain the techniques rather than focussing on the effect of the differences in terms of labour, timing, and markets.

- i) Container grown
Most candidates earned marks by showing what container grown means, although few candidates showed they understood the range of plants grown using this method or the range of containers. Most candidates showed that container grown plants have an extending selling period, but few recorded the value to garden centres and landscapers of this all-year-round product.
- ii) Containerised
Gaining good marks in this section required the candidate to firstly show what it means and then to show how it has some of the advantages of both container grown and open ground plants. Many failed on the second part and some even failed the first part.
- iii) Open ground
Candidates gained marks by demonstrating how the crop was established, although few identified techniques from seed as well as vegetative production. Candidates did not show knowledge of the field scale production of open ground plants (e.g. hedging, native and forest trees). Few candidates identified the extensive but specialised market for open ground grown plants. Lower marks were awarded to candidates who recorded that growing plants in open ground then lifting them and potting them up was within this part of the question.

Section C – Protected Plant Production

- Q15**
- a) Name and describe **THREE** distinct methods by which a grower can determine when to water a plant growing in a container.
 - b) Compare **EACH** of the methods listed in a), by tabulating their advantages and limitations.
 - c) Describe how plant nutrients can be introduced into an irrigation system for liquid feeding.
- a) The majority of candidates were able to name three methods to identify when to water plants growing in containers. Some of the descriptions were very brief and in many cases lacked detail. Some candidates referred to 'looking at the surface of the compost' but they did not explain what they needed to look for in order to make a decision as to whether to water or not. Few candidates referred to the use of moisture meters while observing a wilting plant was a much more popular choice of method - but one where damage may already have been done to the plant.
- b) Not all candidates provided a table although it was requested. Several candidates who chose the plant wilting as an indicator overlooked other reasons why a plant may be wilting. Several candidates failed to appreciate that the weight of the plant, pot and container might be used as sampling tool to identify the watering needs of a batch of plants rather than testing every one.
- c) Few candidates seemed to have a working knowledge of the equipment used to introduce nutrients into irrigation water. Very few candidates referred to the use of either displacement or injector dilutors, and stock solutions. Some candidates described hydroponic systems of growing rather than irrigation systems.

Q16 Describe the production of bedding plants under **EACH** of the following headings:

- i) risk assessment;
- ii) propagation and establishment;
- iii) crop development and maintenance;
- iv) control of pests and diseases.

i) Risk assessment

Several candidates listed the possible risks associated with bedding plant production but did not explain how and why risk assessments as a management process are so important on a horticultural nursery. Emphasis was placed on the identification of the risk rather than the avoidance and the reduction of their likely occurrence.

ii) Propagation and establishment

Not all candidates recognised seed as the most common method of propagation. Answers lacked detail with several making reference to inappropriate containers and or growing methods.

iii) Crop development and maintenance

Most candidates included some good physical practical operations however descriptions were very brief and often incomplete and vague.

iv) Control of pests and diseases

Many candidates described biological control as an option for pest control however very few explained how problems would be avoided at the point of marketing. Some candidates concentrated on the symptoms rather than the control of the pests and diseases named. Several important diseases such as Damping Off were often overlooked by candidates. The importance of good hygiene and optimum environmental growing conditions was well understood and explained by candidates.

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