



Sharing the best in Gardening

**R2102**  
**PLANT NUTRITION AND THE ROOT ENVIRONMENT**

**Level 2**

**Monday 25 June 2012**

**11:00 – 11:40**

**Written Examination**

**Candidate Name:** .....

**Candidate Number:** .....

**Centre Name/Number:** .....

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

- i) The duration of this paper is **40** minutes.
- ii) **ALL** questions should be attempted.
- iii) **EACH** question carries **10 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.
- vii) Please note, sufficient lined space is provided. It is **NOT** necessary that all lined space is used in answering the questions.

Ofqual Unit Code A/601/0314

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

## ANSWER ALL QUESTIONS

## MARKS

**Q1** a) List **FOUR** properties of topsoil that contribute to the healthy growth of plants.

4

[illegible]

b) Describe **THREE** practical horticultural methods used to improve the properties of topsoil.

6

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Total Mark

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

**Q2** a) Explain what is meant by 'soil texture'.

2

b) Describe how soil texture affects the:

- i) physical characteristics of soils;
- ii) suitability of soils for horticultural use.

4

4

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Total Mark

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

**Q3** a) Name **THREE** suitable types of organic waste that can be added to a wormery.

### 3

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.....

.....

.....

b) Name **ONE** type of worm normally used in a wormery.

1

c) Describe the method of composting by using a wormery.

6

[illegible]

Total Mark

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

**Q4** a) Name **TWO** plants that require acid soil.

**2**

.....

.....

.....

.....

b) Give the pH range of soils that would best support the growth of acid-loving plants.

**2**

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.....

.....

c) Describe **THREE** methods of growing acid-loving plants in a garden with a neutral soil pH.

6

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

Total Mark

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

**Q5** a) State what is meant by **EACH** of the types of fertiliser:

- i) compound;
- ii) straight.

**2**

.....

.....

.....

.....

b) Complete the table below for the types of fertiliser in a).

	<b>Compound</b>	<b>Straight</b>
<b>Named example</b>		
<b>Major nutrient(s) supplied</b>		
<b>Method of application</b>		
<b>A garden situation where the fertiliser would be applied</b>		

**2**

**2**

**2**

**2**

Total Mark

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

**Q6** a) State **FOUR** ways in which the choice of growing media can affect the environment.

4

b) Describe the differences between seed and cutting compost; and container compost.

6

This image shows a full page of white paper with horizontal dotted lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Total Mark

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





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## **R2102 PLANT NUTRITION AND THE ROOT ENVIRONMENT**

**Level 2**

**Monday 25 June 2012**

<b>Candidates Registered</b>	582	<b>Pass with Commendation</b>	84 (17%)
<b>Candidates Entered</b>	484	<b>Pass</b>	288 (60%)
<b>Absent/Withdrawn/Deferred</b>	98	<b>Fail</b>	112 (23%)
<b>Total Candidates Passed</b>	372 (77%)		

### **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 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, and preferably 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.
10. Candidates should be aware of the reading list of suggested books for the RHS Level 2 Certificate in The Principles of Plant Growth, Propagation and Development which is available from the Qualifications Section and can also be found on the RHS website together with past papers.

### Examiners' Comments:

		<b>MARKS</b>
<b>Q1</b>	a) List <b>FOUR</b> properties of topsoil that contribute to the healthy growth of plants.	<b>4</b>
	b) Describe <b>THREE</b> practical horticultural methods used to improve the properties of topsoil.	<b>6</b>
	a) The majority of candidates were able to list four suitable properties of topsoil e.g. porosity, soil organisms (both micro and macro), soil structure, organic matter content, air, water and nutrient content etc. and gained full marks.	
	b) Candidates who described suitable methods to improve the properties of top soil were awarded full marks. Examples included; the addition of organic matter in the form of well rotted manure which could be applied as a mulch to the surface of the soil or incorporated by single or double digging during the autumn or winter. This will increase the water holding capacity of the soil, darken its colour so that it heats up more quickly and improve drainage. Other examples included; no dig cultivation, soil pH testing, green manure, installation of drainage and irrigation systems and the use of rotavation.	

<b>Q2</b>	a) Explain what is meant by 'soil texture'.	<b>2</b>
	b) Describe how soil texture affects the:	
	i) physical characteristics of soils;	<b>4</b>
	ii) suitability of soils for horticultural use.	<b>4</b>
	a) The majority of candidates correctly explained that soil texture is the relative proportions of sand, silt and clay particles present in a mineral soil and were awarded full marks.	
	A number of candidates confused soil structure with soil texture and could not be awarded any marks.	
	b) Candidates who included sand, silt and clay in their answers and identified the effects of particle size on the properties of the soils; i.e. sandy soil is free draining, quick to warm up, easy to work and leaches nutrients gained full marks.	
	Details of suitable methods to improve the soil were not required and could not be awarded any marks.	
<b>Q3</b>	a) Name <b>THREE</b> suitable types of organic waste that can be added to a wormery.	<b>3</b>
	b) Name <b>ONE</b> type of worm normally used in a wormery.	<b>1</b>
	c) Describe the method of composting by using a wormery.	<b>6</b>
	a) Most candidates were able to name a range of organic waste suitable for adding to a wormery and included; kitchen waste e.g. bread, vegetable peelings, cheese, green leaves and tea bags.	
	b) The majority of candidates correctly named brandling, red, manure or tiger worms as those suitable for use in a wormery. Earthworms or meal worms are not suitable and could not be awarded any marks.	
	c) The best candidates included diagrams with their descriptions of composting by using a wormery. Details provided of the process included; adding the worms all at once, layering the compost, checking moisture, pH, aeration, temperature – not too cold, siting the wormery in a sheltered place in the garden, insulating it during the winter, using the liquid that can be removed from the bottom as a fertiliser and the compost produced utilised on the garden.	
<b>Q4</b>	a) Name <b>TWO</b> plants that require acid soil.	<b>2</b>
	b) Give the pH range of soils that would best support the growth of acid-loving plants.	<b>2</b>

- c) Describe **THREE** methods of growing acid-loving plants in a garden with a neutral soil pH.

6

- a) The majority of candidates were able to name two suitable plants e.g. *Rhododendron ponticum* and *Pieris japonica* and were awarded full marks.
- b) Candidates were expected to give values that indicated a spread within the pH range. A range of 4.5 – 6.0 was awarded full marks.
- c) Suitable methods selected by candidates were those that required the plants to be isolated from the surrounding soil or localised acidification carried out on the soil. Acceptable methods included containers, raised beds, rockeries constructed with appropriate stone and the addition of sulphur, pine needles, wood ash, farm yard manure or bracken to the soil.

Appropriate growing factors described by the best candidates included; the selection of a suitable growing media, watering plants with rainwater harvested from roofs etc, the use of an ericaceous mulch and the use of an acid based fertiliser.

- Q5** a) State what is meant by **EACH** of the types of fertiliser:

- i) compound;  
ii) straight.

2

- b) Complete the table below for the types of fertiliser in a).

	Compound	Straight
<b>Named example</b>		
<b>Major nutrient(s) supplied</b>		
<b>Method of application</b>		
<b>A garden situation where the fertiliser would be applied</b>		

2

2

2

2

- a) Most candidates correctly stated that a compound fertiliser is one that supplies two or more of the nutrients nitrogen, phosphorus and potassium and that a straight fertiliser is one that supplies one of the major nutrients nitrogen, phosphorus and potassium and were awarded full marks.

- b) Candidates who provided appropriate compound and straight fertilisers and completed the table correctly were awarded full marks. Appropriate examples included Growmore as a compound fertiliser which supplies nitrogen, phosphorus and potassium, can be applied as a top dressing around vegetable crops and would be used as a general fertiliser when growing vegetable crops.

Ammonium nitrate is a suitable example of a straight fertiliser which supplies nitrogen and can be applied as a top dressing on lawns to provide high levels of nitrogen to promote rapid leaf growth.

**Q6** a) State **FOUR** ways in which the choice of growing media can affect the environment. **4**

- b) Describe the differences between seed and cutting compost; and container compost. **6**

- a) The majority of candidates provided suitable examples and gained full marks; e.g. transport of material from point of production/raw materials to end user, the level of sustainability of the source of the raw materials, the manufacturing process i.e. machinery requirements/energy levels etc. and whether the packaging materials are made from recycled material.
- b) The best candidates were able to provide distinct differences between the composts and gained high marks for this section of the question. Seed and cutting compost is composed of finely graded material, usually contains one major ingredient e.g. coir with drainage additive, is well drained but moisture retentive, has an even distribution of pore spaces, is sterile and is low in soluble nutrients except for phosphate.

Container compost has a coarse structure with a wide variation in material and frequently includes several ingredients e.g. composted bark, municipal waste, coir and drainage additive, is free draining but includes water retention granules, has a higher proportion of macro pores, often includes added nutrients frequently as controlled release fertiliser, is not always sterile and has a greater stability due to its weight.

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