



R2103

MAINTAINING PLANT HEALTH

Level 2

Monday 20 June 2022

13:30 – 14:20

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

MARKS

Q1 a) Describe the benefits of **FOUR** distinct **NAMED** organisms that can help maintain the natural balance in a garden, by completing the table below:

Beneficial organism	Description of ONE benefit for EACH organism
1.	
2.	
3.	
4.	

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b) Describe **ONE** method of encouraging **ONE** of the beneficial organisms named in a).

2

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Total Mark

Please see over/.....

MARKS
6

Q4 a) Describe the life cycle of vine weevil.

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b) Describe **TWO** non-pesticide methods of minimising the effects of vine weevil on plant health.

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4

Total Mark

Please turn over/.....

MARKS

Q5 a) Describe the symptoms of fireblight.

3

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b) Describe how fireblight spreads.

3

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c) Describe **TWO** methods of preventing plant health problems from fireblight.

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Total Mark

Please see over/.....

Q6 a) State the life cycle of **EACH** of the following weeds, giving **ONE** distinct horticultural situation where **EACH** may be found:

Name of weed	Life cycle	Horticultural situation
<i>Veronica persica</i>		
<i>Ranunculus repens</i>		
<i>Cardamine hirsuta</i>		
<i>Aegopodium podagraria</i>		

2

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b) Name **ONE** weed that can be an alternate host for a **NAMED** plant pest or disease.

2

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Total Mark

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



R2103

MAINTAINING PLANT HEALTH

Level 2

Monday 20 June 2022

Candidates Registered	902		Total Candidates Passed	627	85%
Candidates Entered	738	82%	Passed with Commendation	309	42%
Candidates Absent/Withdrawn	137	15%	Passed	318	43%
Candidates Deferred	27	3%	Failed	111	15%

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) Describe the benefits of **FOUR** distinct **NAMED** organisms that can help maintain the natural balance in a garden, by completing the table below:

<i>Beneficial organism</i>	<i>Description of ONE benefit for EACH organism</i>
1.	
2.	
3.	
4.	

2
2
2
2

b) Describe **ONE** method of encouraging **ONE** of the beneficial organisms named in a). **2**

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**Q1a)** Most candidates were able to describe the benefits of specific organisms that can help maintain the natural balance in a garden and achieved maximum marks. Suitable answers included:

| <b>Beneficial organism</b> | <b>Description of ONE benefit for EACH organism</b>          |
|----------------------------|--------------------------------------------------------------|
| Ladybird                   | Adults and larvae are predators of aphids.                   |
| Lacewing                   | Larvae are predators of aphids/insect eggs/caterpillars.     |
| Hoverfly                   | Larvae are predators of aphids while adults are pollinators. |
| Frog                       | Predator of slugs/snails.                                    |

Other accepted answers included: Hedgehog, thrush, blue tit, toad, earwig, ground beetle, rove beetle, bees, earthworm, centipedes, wasp.

**Q1b)** Candidates who provided good descriptions of suitable methods to encourage a specific beneficial organism into a garden were awarded full marks. These included:

**Ladybird** – include plants e.g. *Calendula officinalis* that are pollen rich to attract them or provide a habitat for them to overwinter e.g. a bug hotel.

**Lacewing** – include plants e.g. *Achillea millefolium* that are nectar rich to attract them or provide a habitat for them to overwinter e.g. log piles.

**Hoverfly** – create a hoverfly lagoon for the larvae and suitable plants e.g. *Limnanthes douglasii* to attract the adults.

(A hoverfly lagoon is an artificial tree rot hole or bodies of water that some hoverflies use as a breeding site).

**Frog** – Create a wildlife pond to attract frogs with sloping edges for easy access. Include suitable planting within the pond and for shelter around the edge of the pond.

|                                                                                        | <b>MARKS</b> |
|----------------------------------------------------------------------------------------|--------------|
| <b>Q2 a)</b> State what is meant by the term 'plant pest'.                             | <b>1</b>     |
| b) Name <b>ONE</b> pest that feeds by <b>EACH</b> of the following methods:            |              |
| i)     biting                                                                          | <b>1</b>     |
| ii)    piercing/sap sucking                                                            | <b>1</b>     |
| iii)    rasping                                                                        | <b>1</b>     |
| c) Describe how knowledge of the feeding methods of pests can help with their control. | <b>6</b>     |

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Q2a) Maximum marks were gained by candidates who stated that a 'plant pest' is an organism/animal that causes harm or damage to cultivated plants.

Q2b) The majority of candidates were able to name pests that feed by specific methods and achieved full marks. Acceptable answers included:

i) Biting

Vine weevil adults, cabbage white butterfly larvae, deer, rabbits.

ii) Piercing/sap sucking

Peach potato aphid, black bean aphid, glasshouse whitefly, spotted spider mite.

iii) Rasping

Slug/snail.

Q2c) Candidates who had a good knowledge of the feeding methods of pests were able to describe how this can help with their control. Answers which achieved maximum marks included:

A knowledge of the feeding method of a pest can assist with their identification. Identification of a pest enables it to be controlled at the most vulnerable stage in its life cycle. This knowledge will enable a decision to be made on a suitable method of prevention or control of the pest e.g. chemical, physical, biological or integrated pest management. Distorted or mottled foliage can indicate a sap sucking pest while holes in the leaves can indicate biting or rasping pests. The type of hole in the leaves will indicate the pest e.g. a 'U' shaped notch will indicate an adult vine weevil. All of the above knowledge will assist in the selection of an appropriate pesticide and the timing of its application if used.

Q3 a) Name **FOUR** fungal diseases that can affect plant health.

4

b) Describe how fungal diseases can spread.

6

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**Q3a)** A range of suitable fungal diseases were named by most candidates who were awarded full marks. These included:

Grey mould, strawberry powdery mildew, honey fungus, rose black spot, club root, hollyhock rust, apple and pear canker.

Candidates who named bacterial diseases or viruses could not be awarded any marks.

**Q3b)** The best candidates provided good descriptions of how fungal disease can spread and gained full marks. Suitable answers included:

Fungi are usually spread by spores which can be carried by wind, rain splash or soil water. Fungi may be spread by fragments of mycelium on plant tissue and infect through the soil including rhizomorphs. Fungal spores may also be spread by direct contact between plants, including in transit, on boots, clothing, hands, tools and equipment. Spores can overwinter in the soil as thick black-walled spores. Fungal diseases may also be spread in damp conditions.

**Q4 a)** Describe the life cycle of vine weevil.

**6**

b) Describe **TWO** non-pesticide methods of minimising the effects of vine weevil on plant health.

**4**

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Q4a) A good understanding of the life cycle of vine weevil was required by candidates to achieve maximum marks. The best answers included:

Vine weevil have a complete life cycle consisting of; egg, larva, pupa, adult which can be staggered, outdoors or in a glasshouse. Vine weevils are all female and reproduce by parthenogenesis. The first adult beetles appear from the end of April/May and eggs are laid in the root zone of plants e.g. *Rhododendron* from June until September. There are 6 or 7 larval instar stages. Vine weevil overwinter in the larval stage from October to late winter and then pupate in the soil in April/May (spring).

Q4b) Many candidates provided good descriptions of non-pesticide methods of minimising the effects of vine weevil on plant health and were awarded full marks. Acceptable answers included:

Biological control using nematodes can be used to control both the larvae and adult vine weevils. The nematode *Steinernema kraussei* can be used to control the larvae of vine weevil. It is applied as a drench to the soil or container in warm conditions and release bacteria to infect the larvae.

The nematode *steinernema carpocapsae* can be used to control the adult vine weevils. Grooved boards are filled with the nematodes and placed near the plants in a glasshouse or underneath outdoor plants in summer. The nematodes release bacteria which infect the adult vine weevil.

Physical

Inspection of plants on spring/summer evenings and looking under pots/glasshouse staging will enable hand picking of adult vine weevils. Hand picking of larvae can also be carried out when potting/re-potting.

Predators e.g. frogs, ground and rove beetles can also be encouraged into the garden by providing habitats for them.

	MARKS
Q5 a) Describe the symptoms of fireblight.	3
b) Describe how fireblight spreads.	3
c) Describe TWO methods of preventing plant health problems from fireblight.	4

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**Q5a)** Candidates were required to describe the symptoms of fireblight to gain full marks. Suitable answers included:

- tips curling over, 'Shepherd's Crook'
- shoots have the appearance of being scorched by fire/shoots shrivel and die
- blossoms wilt and die
- outer wood is stained a red/brown
- a slimy white liquid is produced in wet weather
- outer wood is stained when bark is pared off with a knife.

**Q5b)** Full marks were awarded to candidates who clearly described how fireblight spreads. Suitable answers included:

- the bacteria are spread by windblown rain, insects and bees
- the bacteria overwinters in bark cankers
- in warm wet weather in spring bacteria oozes out of cankers
- infection can be spread by contaminated tools/secateurs and equipment.

**Q5c)** A range of suitable methods to prevent plant health problems from fireblight were described by candidates who achieved maximum marks. These included:

- prune out and burn all infected plant tissue cutting back to 30-60cm into healthy wood
- grow resistant plants e.g. the Saphyr range of *Pyracantha* cultivars
- wipe pruning tools with disinfectant in between pruning cuts to prevent spread of the bacteria
- remove secondary late blossoms before they open
- avoid *Crataegus monogyna* (Hawthorn) hedges in or near commercial orchards
- adherence to plant transport controls e.g. plant passports are required to be issued at the production nursery.



**Q6 a)** State the life cycle of **EACH** of the following weeds, giving **ONE** distinct horticultural situation where **EACH** may be found:

| <b>Name of weed</b>          | <b>Life cycle</b> | <b>Horticultural situation</b> |
|------------------------------|-------------------|--------------------------------|
| <i>Veronica persica</i>      |                   |                                |
| <i>Ranunculus repens</i>     |                   |                                |
| <i>Cardamine hirsuta</i>     |                   |                                |
| <i>Aegopodium podagraria</i> |                   |                                |

**2**  
**2**  
**2**  
**2**  
**2**

**b)** Name **ONE** weed that can be an alternate host for a **NAMED** plant pest or disease.

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Q6a) Most candidates showed a good understanding of the life cycle of specific weeds and where they can be found and gained full marks. The best answers included:

Name of weed	Life cycle	Horticultural situation
<i>Veronica persica</i>	Annual	Vegetable plots/herbaceous perennial borders.
<i>Ranunculus repens</i>	Perennial	Lawn/damp borders.
<i>Cardamine hirsuta</i>	Ephemeral	Recently cultivated soil/containers.
<i>Aegopodium podagraria</i>	Perennial	Woody perennial plantings/shrub borders/mixed borders.

Q6b) The majority of candidates named a suitable weed that can be an alternate host for a specific plant pest or disease and were awarded full marks. Acceptable answers included:

Capsella bursa pastoris is an alternate host for clubroot.

Senecio vulgaris is an alternate host for cineraria rust.

Veronica persica is an alternate host for stem and bulb nematodes.

Chenopodium album is an alternate host for black bean aphid.

Stellaria media is an alternate host for eelworms of strawberries.

Sonchus arvensis is an alternate host for glasshouse whitefly.
