Including examiner comments

R2103

MAINTAINING PLANT HEALTH

Level 2

Monday 24 June 2019

13:30 – 14:20

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.

Ofqual Unit Code Y/505/2835

Please turn over/…..

ANSWER ALL QUESTIONS

MARKS

Q1 a) Describe the damage caused to plants by the peach potato aphid. **4**

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b) State how **TWO NAMED** beneficial organisms can be encouraged into a garden to help control peach potato aphid. **4**

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c) Name **ONE** pest that causes damage by **EACH** of the following:

i) biting **1**

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ii) rasping **1**

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Total Mark

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MARKS

Q2 a) Describe what is meant by the term “annual weed”. **2**

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b) State the characteristics of **TWO NAMED** distinct annual weeds that are found in recently cultivated soil. **4**

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c) State **FOUR** problems caused by perennial weeds in an established lawn. **4**

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Total Mark

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MARKS

Q3 a) Describe the life cycle of the black bean aphid using a labelled diagram. **6**

b) Describe the method that black bean aphids use to breathe. **2**

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c) State **ONE NAMED** example for **EACH** of the following control methods for black bean aphid:

i) physical **1**

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ii) chemical **1**

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Total Mark

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MARKS

Q4 a) Describe what is meant by plant disease. **2**

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b) Describe honey fungus under **EACH** of the following headings:

i) damage caused **2**

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ii) **ONE** method of spread **2**

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iii) **TWO** distinct methods of control **4**

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Total Mark

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MARKS

Q5 a) State **TWO** reasons for controlling weeds. **2**

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b) Name **ONE** distinct chemical and its mode of action for **EACH** situation listed by completing the table below:

Weed / situation	**Active chemical**	**Mode of action**	
***Aegopodium podagraria* in an established shrub border.**			**2**
***Cardamine hirsuta* in a newly cultivated soil.**			**2**
***Ranunculus repens* in an established lawn.**			**2**

c) State how the use of pesticides can disturb the natural balance of plant protection in a garden situation. **2**

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Total Mark

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MARKS

Q6 a) Describe the effects of fasciation on plants. **2**

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b) Describe the effects of growing an acid-loving plant in an alkaline soil. **4**

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c) Describe **TWO** methods of avoiding frost damage on plants. **4**

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Total Mark

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Inspiring everyone to grow

R2103

MAINTAINING PLANT HEALTH

Level 2

Monday 24 June 2019

Candidates Registered	**776**		**Total Candidates Passed**	**545**	**80%**
Candidates Entered	680	88%	Passed with Commendation	282	41%
Candidates Absent/Withdrawn	90	11%	Passed	263	39%
Candidates Deferred	6	1%	Failed	135	20%

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.

MARKS

Q1

a) Describe the damage caused to plants by the peach potato aphid. **4**

b) State how **TWO NAMED** beneficial organisms can be encouraged into a garden to help control peach potato aphid. **4**

c) Name **ONE** pest that causes damage by **EACH** of the following:

i) biting **1**
ii) rasping **1**

Q1a) Maximum marks were gained by candidates who provided detailed descriptions of the damage caused to plants by the peach potato aphid. The best answers included:

- The peach potato aphid causes damage by sap sucking which can be identified by yellowing, mottled leaves and curled/puckered/distorted young growth
- Honeydew is excreted on the leaf by the aphid which leads to the secondary infection of sooty mould. This blocks the light from reaching the leaf and impedes the rate of photosynthesis
- Aphids can transmit viruses from one plant to another through their stylets whilst sucking the sap e.g. potato leaf roll virus

Q1b) The best candidates provided specific details of how beneficial organisms can be encouraged into a garden to help control peach potato aphid. Suitable answers included:

- Blue tits can be encouraged with the provision of food e.g. bird seed and fat balls and hedges and bird boxes for nesting
- Parasitic wasps e.g. *Ahidus praon* can be supplied as parasitised aphids which can be placed on plants in the evening. Rove beetles can also be used
- Ladybirds and lacewings can be encouraged by providing overwinter shelter in hollow stems, herbaceous material, crevices in walls etc. or by purchasing products which provide a similar habitat and are called 'insect hotels'

Q1c) The majority of candidates were able to name specific pests and were awarded full marks. Acceptable answers included:

i) **Biting** – vine weevil, deer, rabbit, caterpillars
ii) **Rasping** – Slug, snail

		MARKS
Q2 a)	Describe what is meant by the term “annual weed”.	**2**
b)	State the characteristics of **TWO NAMED** distinct annual weeds that are found in recently cultivated soil.	**4**
c)	State **FOUR** problems caused by perennial weeds in an established lawn.	**4**

Q2a) Candidates who showed a good understanding of the meaning of the term ‘annual weed’ received full marks. Suitable answers included:

An annual weed is one which completes its life cycle in one growing season i.e. it germinates in spring, grows, flowers, sets seed and dies in one growing season.

Q2b) Many candidates correctly named and stated the characteristics of annual weeds found in recently cultivated soil and achieved maximum marks. These included:

Stellaria media, Poa annua, Veronica persica, Chenopodium album. These weeds produce copious amounts of seed, they have shallow fibrous roots and their seed can overwinter in the soil and remain viable for many years.

Candidates who named ephemeral or perennial weeds could not be awarded any marks.

Q2c) Candidates provided a range of problems caused by perennial weeds in an established lawn and gained full marks. Perennial weeds can:

- Compete for light as large rosette shaped leaves block out light required by the grasses
- Compete for water as large leaves and deep tap roots can absorb water more readily than grasses
- Harbour pests and diseases
- Cause an uneven playing surface for sports e.g. golf
- Appear aesthetically unattractive as the broad leaves and tall flower heads look unsightly

		MARKS
Q3 a)	Describe the life cycle of the black bean aphid using a labelled diagram.	**6**
b)	Describe the method that black bean aphids use to breathe.	**2**
c)	State **ONE NAMED** example for **EACH** of the following control methods for black bean aphid:	
	i) physical	**1**
	ii) chemical	**1**

Q3a) Maximum marks were gained by candidates who were able to describe the life cycle of the black bean aphid with the use of a labelled diagram. The best answers included:

- Overwinters as small, black eggs on winter host e.g. *Viburnum opulus* or *Euonymus europaeus*
- Eggs hatch in spring/April, all female and wingless
- Colonies develop on young leaves and shoots and females produce live young/parthenogenesis
- From May onwards winged females are produced
- Winged females migrate to beans and summer host plants e.g. nasturtium, dahlia and poppies
- In autumn another winged generation of male and female aphids is produced that migrate back to the winter host
- Mating takes place and the eggs are laid in crevices on the stems and around the buds on the winter host

Q3b) The majority of candidates correctly described the location, tiny openings in the body wall and use of spiracles by black bean aphids to breathe. The best candidates also described the role of the blind ended air filled tubes called tracheae which disperse oxygen around the aphids' body.

Q3c) A range of examples of specific control methods for black bean aphid were provided by the best candidates who were awarded full marks. Acceptable answers included:

i) **Physical** – squashing/rubbing aphids off between finger and thumb, removal of the bean shoot tips by pinching out by hand before the aphids are able to colonise the plant and using a strong jet of water to wash aphids from an infested plant, without causing damage to the plant.

ii) **Chemical** – The use of fatty acids, pyrethrin or deltamethrin.

		MARKS
Q4 a)	Describe what is meant by plant disease.	**2**
Q4b)	Describe honey fungus under **EACH** of the following headings:	
	i) damage caused	**2**
	ii) **ONE** method of spread	**2**
	iii) **TWO** distinct methods of control	**4**

Q4a) The majority of candidates correctly described a plant disease as an abnormal growth and/or dysfunction of a plant caused by an infectious micro-organism (pathogen) e.g. virus, bacteria, fungi.

Q4b) Good descriptions of honey fungus were provided by many candidates who achieved full marks. Suitable answers included:

i) **Damaged caused** – The crown of the tree sometimes dies suddenly during periods of hot, dry weather indicating a failure of the root system. The leaves are smaller and paler than average. The tree may fail to flower or produce a large number of flowers followed by a heavy crop before it dies. Cracking and bleeding of the bark at the base of the tree and dead or decaying roots may be present.

ii) **Method of spread** – Honey fungus is spread via rhizomorphs underground and can spread up to 30m in the top 15cm of the soil. It can also spread through direct contact of the roots of infected trees with unaffected ones.

iii) **Methods of control** – Plant species that show some resistance to honey fungus e.g. *Ginkgo biloba, Quercus ilex* and do not plant susceptible species e.g. *Fagus sylvatica, Ligustrum vulgare.* Dig out the whole tree including the stump and as much root as possible and destroy it by burning. A trench can be dug around the affected tree and a butyl rubber sheet used to form a barrier to prevent the growth of the rhizomorphs.

MARKS

Q5 a) State **TWO** reasons for controlling weeds. **2**

b) Name **ONE** distinct chemical and its mode of action for **EACH** situation listed by completing the table below:

Weed / situation	**Active chemical**	**Mode of action**	
***Aegopodium podagraria* in an established shrub border.**			**2**
***Cardamine hirsuta* in a newly cultivated soil.**			**2**
***Ranunculus repens* in an established lawn.**			**2**

c) State how the use of pesticides can disturb the natural balance of plant protection in a garden situation. **2**

Q5a) Most candidates were able to state suitable reasons for controlling weeds and gained maximum marks. These included:

- To remove competition for light, water and nutrients
- To make harvesting crops easier
- To remove hosts for pests and diseases
- Avoid weeds looking unsightly

Q5b) Candidates who showed a good knowledge of chemicals and their mode of action for specific weeds achieved full marks. Suitable answers were:

Aegopodium podagraria – e.g. Glyphosate which is translocated.
Cardamine hirsuta – e.g. Acetic acid, Fatty acid or Diquat which have a contact mode of action.
Ranunculus repens – e.g. 2,4-D or Fluroxypyr which are selective herbicides.

Q5c) Candidates who clearly understood how the use of pesticides can disturb the natural balance of plant protection gained full marks. Acceptable answers included:

- Beneficial insects/natural predators that are active can be destroyed particularly in the middle of the day. If beneficials are destroyed biological controls will not be successful
- Overuse of pesticides may cause damage to other plants or destroy natural habitats where beneficial insects/natural predators would overwinter or breed. This could cause the pest population to explode if there are no natural predators
- Excessive use of certain pesticides may cause resistance in pest/disease populations which would result in their increase

		MARKS
Q6 a)	Describe the effects of fasciation on plants.	**2**
b)	Describe the effects of growing an acid-loving plant in an alkaline soil.	**4**
c)	Describe **TWO** methods of avoiding frost damage on plants.	**4**

Q6a) Many candidates were able to describe the effects of fasciation on plants as a distorted stem which is flattened in appearance. Flowers can also appear distorted with flattened flower heads from the fasciated stem.

Q6b) Full marks were awarded to candidates who were able to describe the effects of growing an acid-loving plant in an alkaline soil. Acceptable answers included:

Lime-induced chlorosis occurs where manganese and iron become unavailable to the plant causing interveinal chlorosis/yellowing of the leaves. Photosynthesis is reduced as iron is required to make chlorophyll. The colour of Hydrangea flowers also changes from blue in acid soils to pink in alkaline soils.

Q6c) The best candidates provided descriptions of suitable methods of avoiding frost damage to plants. These included:

- Take tender plants into a protected structure e.g. a greenhouse or conservatory
- Wrap large tender plants, which cannot be relocated in fleece or cover with bracken/straw to protect their growing tips from frost
- Do not plant tender plants in frost pockets or areas where the early morning sun can damage flowers e.g. Camellias
- Apply a 75 – 100 mm layer of organic mulch around the base of herbaceous perennials etc. to protect the root zone

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