



R2103

MAINTAINING PLANT HEALTH

Level 2

Monday 19 June 2017

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.

MARKS

Q2 a) Describe **TWO** ways to avoid the growth of weeds in a lawn.

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b) Name **TWO** distinct perennial weeds found in lawns.

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c) Name the active ingredient of **TWO** herbicides, stating their mode of action, by completing the table below.

	Active ingredient	Mode of action
1.		
2.		

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Total Mark

Please turn over/.....

MARKS

5

Q3 a) Describe in outline the life-cycle of clubroot.

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b) Describe **TWO** methods of minimising the effects of clubroot.

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c) Name **ONE** plant that is susceptible to infection by clubroot.

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Total Mark

Please see over/.....

Q4 a) State **TWO** effects of **EACH** of the following causes of damage on plant growth, by completing the table below.

Cause of damage	Effect 1	Effect 2
Frost		
Waterlogging		
Low Temperature		

2

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b) Describe the effects of soil pH on plants in a garden.

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Total Mark

Please turn over/.....

MARKS

6

Q5 a) Outline the life cycle of potato cyst eelworm.

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b) State **TWO** ways of limiting the spread of potato cyst eelworm (other than using a resistant cultivar).

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Total Mark

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MARKS

Q6 a) Describe how **EACH** of the following beneficial organisms can be encouraged into a garden:

- i) frogs;
- ii) ladybirds.

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i).....

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ii).....

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b) State the damage caused by the inappropriate use of **TWO** garden practices that disturb the natural balance in a garden.

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Total Mark



Sharing the best in Gardening

R2103

MAINTAINING PLANT HEALTH

Level 2

Monday 19 June 2017

Candidates Registered	806		Total Candidates Passed	529	76.78%
Candidates Entered	689	85.48%	Passed with Commendation	196	28.45%
Candidates Absent/Withdrawn	106	13.15%	Passed	333	48.33%
Candidates Deferred	11	1.37%	Failed	160	23.22%

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 **TWO** ways in which the use of pesticides can be minimised.

b) State **TWO** distinct methods used to minimise the damage caused by the Cabbage White butterfly, by completing the table below.

	Methods of control	Stage of pest life-cycle
1.		
2.		

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Q1a) The majority of candidates showed a good understanding of the use of biological and physical controls as well as good horticultural practices to minimise the use of pesticides and gained maximum marks. Suitable answers included:

- Encouraging natural predators which feed on pests by providing habitats e.g. providing bird boxes for blue tits which feed on insects
- Growing companion plants e.g. *Limnanthes douglasii* to encourage hoverflies which predate on aphids
- Use of biological controls e.g. *Encarsia formosa* to control glasshouse whitefly
- Maintaining garden hygiene by destroying infected crops

Q1b) Candidates who gave specific details of methods used to minimise the damage caused by the Cabbage White butterfly were awarded full marks. Acceptable answers included:

- A bacterial spray of *Bacillus thuringiensis* for the larval (caterpillar) stage
- Crops can be covered by fine netting to prevent the adult butterfly from laying eggs
- Use of the chemicals Deltamethrin or Cyhalothrin can be used to kill the larval stage (caterpillar)

Q2 a) Describe **TWO** ways to avoid the growth of weeds in a lawn.

4

b) Name **TWO** distinct perennial weeds found in lawns.

2

c) Name the active ingredient of **TWO** herbicides, stating their mode of action, by completing the table below.

	Active ingredient	Mode of action
1.		
2.		

2

2

Q2a) A range of ways to avoid the growth of weeds in a lawn were described by the best candidates who gained full marks. Suitable answers included:

- Scarifying/aerating/top dressing the lawn as appropriate to maintain a healthy sward to avoid competition with weeds
- Re-seed bare patches in the lawn to avoid weed seeds germinating
- Ensure that borders adjacent to the lawn are kept weed free to prevent weed seeds being spread into the lawn
- Frequent mowing to remove weed seed heads

Q2b) Most candidates were able to name perennial weeds found in lawns and were awarded full marks. These included; *Taraxacum officinale*, *Bellis perennis*, *Plantago minor*.

Q2c) Candidates who named the active ingredient and the mode of action of specific herbicides gained maximum marks. Suitable answers included; Diquat which is a contact herbicide, Glyphosate which is a translocated herbicide and Propyzamide which is a residual (soil acting) herbicide.

	MARKS
Q3 a) Describe in outline the life-cycle of clubroot.	5
b) Describe TWO methods of minimising the effects of clubroot.	4
c) Name ONE plant that is susceptible to infection by clubroot.	1

Q3a) Full marks were gained by candidates who described the life cycle of clubroot well. Detail that was awarded marks included:

- Resting spores of clubroot can persist in the soil for at least 20 years
- Spores germinate due to chemical stimulation from the host plant roots i.e. brassicas
- Swimming spores are produced which invade roots through the root hairs
- The roots swell and become distorted
- Resting spores are formed within the swellings and are released into the soil when the swellings decay

Q3b) Many candidates described a range of suitable methods which can be used to minimise the effects of clubroot. Acceptable answers which were awarded full marks included:

- Ensure that soil is removed from boots, tools and tractor wheels
- Increase the pH of the soil by applying lime as clubroot thrives in an acid soil
- Avoid planting contaminated seedlings, larger transplants have a better success rate
- Control weeds, especially those in the brassica family that act as a host for the spores
- Use resistant varieties e.g. Brassica 'Kilaxy'

Q3c) A wide range of plants which are susceptible to infection by clubroot were correctly named by most candidates who were awarded full marks. These included; Brussels Sprouts 'Crispis', Cabbage 'Hispi', *Capsella bursa-pastoris*, *Sinapis alba*, *Erysimum cheiri*, *Matthiola incana*.

Q4 a) State **TWO** effects of **EACH** of the following causes of damage on plant growth, by completing the table below.

Cause of damage	Effect 1	Effect 2
Frost		
Waterlogging		
Low Temperature		

2

2

2

b) Describe the effects of soil pH on plants in a garden.

4

Q4a) Candidates who were able to state the effects of the specific causes of damage on plant growth gained maximum marks. Suitable answers included:

Frost – damage includes blackening of leaves/stems, bark split or root heave.

Waterlogging – damage includes yellowing or blackening of foliage, wilting or rotting of roots.

Low Temperature – stunted/poor growth, seeds failing to germinate, poor pollination of fruit and loss of yield.

Q4b) Many candidates showed a good understanding of the effects of soil pH on plants in a garden and were awarded full marks. The best answers included the following points:

- pH levels affect the uptake of nutrients
- Most nutrients are available at a pH of 6.5
- Iron may be unavailable to acid loving plants if grown in an alkaline soil
- Iron is required for the manufacture of chlorophyll. A loss of chlorophyll will therefore reduce the rate of photosynthesis and can cause lime-induced chlorosis
- Soil fauna e.g. earthworms and microbial activity is reduced in acid soils and can affect plants as soil aeration is reduced
- The colour of Hydrangea flowers are affected by soil pH

Q5 a) Outline the life cycle of potato cyst eelworm.

6

b) State **TWO** ways of limiting the spread of potato cyst eelworm (other than using a resistant cultivar).

4

Q5a) The best candidates outlined the life cycle of potato cyst eelworm and gained maximum marks. Suitable outlines included:

Potato cyst eelworm can survive in the soil for at least 10 years without a crop of potatoes to infect. The cysts are the dead, swollen bodies of female eelworms which contain approximately 200 – 600 eggs. Most eelworms hatch within one year when potatoes or closely related weeds grow near them. The roots of the plants release chemicals which stimulate the eggs to hatch. The recently hatched eelworms can swim short distances through the soil to locate the roots and start feeding. The females are fertilised by males and then develop into cysts and breakaway. The females eventually die with the eggs inside them. When conditions are suitable the next generation hatch and commence the cycle.

Q5b) Most candidates were able to state ways of limiting the spread of potato cyst eelworm and were awarded full marks. Suitable answers included:

- The use of early crop potatoes so that the eelworm has less chance to develop
- Ensuring good hygiene to avoid transfer of soil on boots, tools etc.
- Reduce possible contamination by growing potatoes in pots with fresh, sterilised soil
- Sowing *Solanum sisymbriifolium* to trigger the eggs to hatch. The eggs cannot develop in the roots which helps eliminate the soil of live eggs

Q6 a) Describe how **EACH** of the following beneficial organisms can be encouraged into a garden:

- i) frogs;
- ii) ladybirds.

3
3

b) State the damage caused by the inappropriate use of **TWO** garden practices that disturb the natural balance in a garden.

4

Q6a) The majority of candidates provided good descriptions how specific beneficial organisms can be encouraged into a garden. Acceptable answers which gained full marks included:

- i) **Frogs** are encouraged by the provision of a pond with sloping sides/rocks for easy access, the planting of native plants for cover and the provision of suitable habitats e.g. damp areas.
- ii) **Ladybirds** are encouraged by providing overwintering places e.g. hollow canes and bug hotels or wild areas, use of selective pesticides or preferably not using any pesticides. The growing of pollen rich flowers (but not nectar rich as ladybirds do not feed on nectar) will encourage ladybirds when aphids are absent.

Candidates who stated that tolerance of some aphid presence in a garden was necessary to encourage ladybirds (as this is their main source of food) were also awarded marks.

Q6b) Maximum marks were awarded to candidates who were able to state the damage caused by the inappropriate use of garden practices which disturb the natural balance in a garden. Acceptable answers included:

- Over digging will destroy the soil structure and will reduce the population of earthworms and other beneficial organisms in the soil
- Over use of fertilisers will encourage soft, sappy growth which attracts pests e.g. aphids
- Cutting hedges in spring when birds are nesting will reduce suitable habitats
