Including examiner comments

R3103

THE MANAGEMENT OF PLANT HEALTH

Level 3

Wednesday 21 June 2023

11:45 – 12:50

Written Examination

Candidate Number: .....

Candidate Name: .....

Centre Name: .....

IMPORTANT – Please read carefully before commencing:

i) The duration of this paper is **65** 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.

Ofqual Unit Code D/505/2934

Please turn over/…..

ANSWER ALL QUESTIONS

MARKS

Q1 a) Describe western flower thrips under **EACH** of the following headings:

i) damage to plants **2**
ii) control measures. **4**

Please see over…..

MARKS

b) Explain why western flower thrips are successful as a plant pest. **4**

Total Mark

Please turn over/…..

MARKS

Q2 a) List **FOUR** characteristics of hairy bittercress that make it a successful weed. **4**

Please see over/…..

MARKS

b) Describe **THREE** distinct methods to control hairy bittercress relating each to a distinct named horticultural situation. **6**

Total Mark

Please turn over/…..

MARKS

Q3 Describe *Phytophthora ramorum* under **EACH** of the following headings:

i) spread and transmission **6**
ii) statutory controls **4**

Please see over/…..

MARKS

Total Mark

Please turn over/…..

MARKS

Q4 a) Identify **FOUR** environmental issues to be considered before applying a pesticide. **4**

Please see over/…..

MARKS

b) State **TWO** methods of minimising risks to the environment when using pesticides under **EACH** of the following headings:

i)	product selection	**2**
ii)	choice of equipment for application	**2**
iii)	disposal of pesticide waste.	**2**

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Please turn over/…..

Total Mark

MARKS

Q5 a) Describe the symptoms and damage caused by potato leaf curl (leaf roll) virus on a **NAMED** host. **5**

Please see over/…..

MARKS

b) State **FIVE** control methods which could be used to control potato leaf curl (leaf roll) virus. **5**

Total Mark

Please turn over/…..

MARKS

Q6 a) List the hierarchy of controls used in Integrated Pest Management (IPM). **3**

b) Describe **THREE** distinct IPM strategies used to reduce pesticide resistance for a **NAMED** pest. **7**

Please see over/…..

MARKS

Total Mark

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R3103

THE MANAGEMENT OF PLANT HEALTH

Level 3

Wednesday 21 June 2023

Candidates Registered	**56**		**Total Candidates Passed**	36	82%
Candidates Entered	44	78%	Passed with Commendation	14	32%
Candidates Absent/Withdrawn	7	13%	Passed	22	50%
Candidates Deferred	5	9%	Failed	8	18%

General comments

Where a plant example is chosen, it is important to write the FULL botanic name and not just a partial name, following the correct naming protocols. Where named plant examples are required, common names are not credited at Level 3.

Spellings of scientific terms and botanic plant names need to be full and accurate - poor spellings may be penalized.

Questions - It is essential to read the question carefully and to note the **key words** before starting to write to ensure answers are relevant. Candidates should take account of the command statements in the question e.g. 'list', 'describe', 'explain', together with the mark allocation, to judge the depth of the answer required. Extra information, even if it is accurate, does not gain extra marks.
Where a number of answers were specified in the question and a candidate gave a list with more than that number, **only the first answers** in the list were marked, e.g. where the question stated 'Name **TWO** locations' or 'State **TWO** ways' only the first **TWO** answers were marked even if the correct answers were given further down. It is helpful (but not essential) if the answers are numbered in the text or separate paragraphs or bullet points are used.

Plant names - Where named plant examples were asked for, **full botanical names are required** to achieve full marks: genus, species and where appropriate variety, cultivar etc. needed to be written and spelt correctly. Where genus alone was given, all species in that genus need to show the characteristic asked for to gain any credit. **Common names were NOT accepted** and misspellings were penalised. Candidates needed to use unambiguous plant examples from sources such as the RHS Plant Finder and/or the RHS A-Z Encyclopaedia of Plants together with examples given in the syllabus and avoid obscure or difficult to verify plant examples, which risked being not credited.

Labels on diagrams must be carefully and correctly positioned to avoid ambiguity. Marks can be easily lost if this is not followed. Labels must actually touch the appropriate part of the diagram and must not be left hanging in mid air. Annotations on diagrams can be accepted as an alternative to description in the text as long as these are clear and answer the question. No marks were awarded for artistic merit or for unlabelled diagrams.

Continuation sheets - Where these have been included, it is vital that the relevant question number is included in the left hand margin if information written here is to be considered. These should also be attached to the answer booklet in the appropriate place and candidates should indicate in their answer booklet that they have written part of their answer on the attached sheet/s.

Q1 a) Describe western flower thrips under **EACH** of the following headings:

i) damage to plants
ii) control measures.

b) Explain why western flower thrips are successful as a plant pest

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Q1 a)

i) Responses to this part of the question were mixed with some candidates knowing well the damage caused by western flower thrips which included silvering of leaves and rasping damage due to feeding with presence of black spots of frass on upper leaf surface, but very few mentioned that the damage to the leaf is rough rather than smooth clean cuts,
There was little mention of secondary infection being possible.

ii) Control measures for WFT seemed to be reasonably well understood with candidates who took the written paper rather than the online version providing a more detailed description of the actions to be taken.
Forms of biological controls that might be used were identified by some but again, often without the life cycle stage that it would control. Encouraging beneficial predators such as birds was mentioned by some, but not how this might be achieved to make enough of a difference to pest populations. The use of barrier meshes in protected cropping was mentioned by many as well as the use of chemicals and insecticides, but often not stating the mode of action to gain additional marks.

b) This part of the question was less well answered with candidates not providing enough explanation as to what makes WFT a successful pest for example, saying “adult thrips are harder to treat with pesticides” does not explain why this is and would need to be qualified by explaining about pesticide resistance. Some candidates also felt that because WFT overwinters that this made it a successful pest, all pests overwinter, there needed to be a good explanation of why this makes it successful in order to gain marks. Most candidates mentioned that adults are winged and can fly to a wide host range of plants, and that there were several life cycles in a year. Other answers that would have scored marks are that given the right environmental conditions WFT can breed all year round, or that it is easily transported in all its life cycle stages by movement of plants, soil, people and equipment. However, this section was not particularly well tackled
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Q2 a) List **FOUR** characteristics of hairy bittercress that make it a successful weed.

b) Describe **THREE** distinct methods to control hairy bittercress relating each to a distinct named horticultural situation

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Q2 a)

Most candidates had a good understanding of what makes hairy bittercress a successful weed but some did not gain full marks as they had not given a full answer such as “hairy bittercress has explosive seed pods meaning that the seed is ejected up to 1m from the mother plant causing it to spread with each generation” but simply stated “explosive seed pods” and therefore only gaining half marks. Other marks could have been gained by stating that it has a short life cycle and many generations in a season as it is an ephemeral weed. One plant can produce between 600 and 1000 seeds meaning that large numbers are produced quickly, candidates who gave a vague answer such as “produces a lot of seed” or were outside of the recognised range only gained a half mark for their answer. Perhaps one of the most important factors is that Hairy Bittercress is hardy and will survive outside over winter so that as soon as temperatures begin to rise in the early spring it can start to produce flowers and seed, expanding the length of the species’ active period.

b)

Methods of control were generally well understood and related well to the given situation for use, but again were sometimes lacking in detail to gain full marks. Simply saying to apply a chemical to a path to prevent spread needed to be filled out with the type of chemical to be used such as acetic acid, how it should be applied i.e., “sprayed on the foliage” and perhaps even at what time of day would be best to carry out the operation to avoid damage to pollinating insects. To hand weed or hoe as a form of control in a herbaceous border or vegetable garden would be acceptable, but would have gained additional marks if the candidate had backed this up with a statement about doing it on a warm sunny day so that the weed desicates and does not get an opportunity to re-root, equally stating that the process must take place before the plant gets the opportunity to flower and produce seed would have given another mark. Other methods of control suitable for an herbaceous border would be a deep mulch of compost or bark, or spot treatment with a systemic herbicide to avoid damage to other plants. A systemic herbicide such as Glyphosate could also be used in non-cropped areas in a vegetable garden where it could be applied as spray to the entire area.

Some candidates did not give a named situation and so automatically could not gain full marks. Many explanations were vague and did not demonstrate three distinct methods.
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Q3 Describe *Phytophthora ramorum* under **EACH** of the following headings:

i) spread and transmission
ii) statutory controls

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Q3

i) Candidates generally had a reasonable understanding of the spread and transmission of *Phytophthora ramorum* but some struggled to give a full range of methods and some did not provide enough description to gain full marks. Here again, a lack of detail was shown by some candidates even though the marks were not difficult to get. Most marks were gained from stating plants become infected through spores in water splash, spores could be carried in the wind particularly during moist conditions and also in some way by humans, animals and transport. Some correctly identified spread through water courses but very few gave any information about long lived resting spores for overwintering. Some did know the host plants the fungus affects for example *Rhododendron ponticum, Larix kaempferi, Camellia* spp*. and Viburnum* spp*.*

ii) This question was generally well answered with most candidates understanding that the disease needed to be notified immediately to the authorities, but some not providing the right section of the government, which is the Animal and Plant Health Agency APHA or the Forestry Commission. Some candidates added to their marks by stating that a statutory notice for the destruction, through burning, of the affected plants would be put in place, but ongoing restrictions including replanting susceptible species were rarely mentioned. Some candidates talked about the need for Phytosanitary Certificates when importing from Europe which are no longer relevant since the UK left the EU*.*
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Q4 a) Identify **FOUR** environmental issues to be considered before applying a pesticide.

b) State **TWO** methods of minimising risks to the environment when using pesticides under **EACH** of the following headings:

i) product selection
ii) choice of equipment for application
iii) disposal of pesticide waste.

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Q4 a) This part of the question looked at the considerations for limiting damage to the environment when using pesticides before going to site to carry out the application; it was not related to the use of IPM strategies such us the use of biological controls, as was given by some candidates in their answers. The environmental issues credited included pesticide application practices to limit effects on the environment by considering watercourses (buffer zones) and pollinating insects by spraying at appropriate time of day to cause least damage to pollinating and beneficial insects, and informing local beekeepers. Other issues included; appropriate wind conditions to reduce spray drift, and prevent exposure of the public and their pets and other animals to the pesticide. This section was quite well answered as candidates did understand environmental implications.

b)

i) Two methods of minimising risk in pesticide selection included selection of the least harmful product to bees and other beneficial insects, and formulation of the product, for instance could a spot treatment gel be used rather than a broad spray application along with any relevant considerations for restrictions such as harvest intervals.
ii) Priorities for selecting application equipment are that the equipment used is appropriately sized, in good working order, with no damage or leaks, and then considering things like nozzle selection to ensure accuracy of application.
iii) In relation to minimising risks when disposing pesticide waste, most candidates stated mixing the correct volume to minimise waste. Other credited answers were disposal via certified contractors and spraying off washings. Few candidates discussed the need to keep washings in the original containers if being stored for collection or cordoning off waste application areas to restrict public access.
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Q5 a) Describe the symptoms and damage caused by potato leaf curl (leaf roll) virus on a **NAMED** host.

b) State **FIVE** control methods which could be used to control potato leaf curl (leaf roll) virus.

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Q5 a)

Symptoms and damage of Potato Leaf Curl virus were generally fairly well understood and, in most cases, candidates gave the appropriate Latin name for *Solanum tuberosum* (potato)or *Solanum lycopersicum* (tomato) to gain an easy mark, however simply saying 'potato' or 'tomato' only gained a ½ mark. Equally, giving 'leaf curl' as a symptom was not sufficient to gain a full mark, the candidate was here required to provide details such as the leaves curl inwards from the edges. Many candidates incorrectly stated that the leaves of the plant would show yellowing when in fact the leaves show red/orange and purple hues. Other marks could be gained for noting that the foliage will "rattle" if shaken and can have a "papery" feel. Tuber net necrosis can also be found in affected potato plants and the crop is often reduced due

b) to the plants reduced vigour as a result of stunted growth.

Candidates had a good understanding of the range of control methods for this virus but in some cases focused on control of Aphid as the vector which, whilst this is a valid point and would gain one mark it would not be credited for more than one example of control. Candidates could also give relevant answers such as the selection of resistant cultivars, using certified seed from reputable sources and the disposal of infected crops by burning (and not being put on the compost heap). Other control methods were generally well understood, such as the need for control of weeds, however a number of candidates suggested crop rotation which is not deemed to be a control for potato leaf roll.
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Q6 a) List the hierarchy of controls used in Integrated Pest Management (IPM).

b) Describe **THREE** distinct IPM strategies used to reduce pesticide resistance for a **NAMED** pest.

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Q6 a)

This part of the question should have represented a fairly easy set of marks as all candidates should have learnt the hierarchy of controls used in IPM strategies in many of the subjects taught, but few managed to gain a high mark. A simple list of the stages; monitoring, cultural, environmental, biological, biopesticides (IPM compatible), chemical (non-IPM compatible*).*

b)

Candidates recognised the need for a named pest to which they could relate their controls, for example two-spotted spider mite, aphid, box tree moth caterpillar or mice. However, a few used a fungal disease as their named pest and were not credited for this. In some cases, candidates wrote a lot about IPM generally without giving sufficient details of clear controls and methods of use.

The expected level of detail required, for box moth caterpillar would include:

Cultural control for small infestation can be achieved by inspecting plants on a regular basis to find the caterpillars and remove them by picking them off by hand after which they should be disposed of by dropping them into a bucket containing soapy water which will kill them.

A suitable biological control would be the use of *Bacillus thuringiensis* which can be applied as a spray from a knapsack.

Finally, a third choice of control would be using a chemical control such as Provado Ultimate Bug Killer containing a synthetic pyrethroid, sprayed onto the box plants.

Unfortunately, a lot of answers were not detailed enough to gain full marks by describing the control method selected.

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