Including examiner comments

R3103

THE MANAGEMENT OF PLANT HEALTH

Level 3

Wednesday 26 June 2019

11:45 – 12:50

Written Examination

Candidate Number:……

Candidate Name:……

Centre Number/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 may 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 D/505/2934

Please turn over/…..

ANSWER ALL QUESTIONS

			MARKS
Q1	a)	Describe the symptoms of ash dieback (*Hymenoscyphus fraxineus).*	**4**
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
	b)	State how ash dieback disease spreads.	**2**
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	
		.....	

Please see over/…..

MARKS

c) State **FOUR** biosecurity measures to prevent the spread of ash dieback. **4**

Total Mark

Please turn over/…..

MARKS

Q2 Describe the safety requirements for storage of pesticides under the **EACH** of the following headings;

i) security; **2**
ii) stock control; **2**
iii) product separation; **2**
iv) emergency precautions. **4**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Please see over/…..

MARKS

Total Mark

Please turn over/…..

MARKS

Q3 Describe the control methods for vine weevil, stating the targeted life-cycle stage, under **EACH** of the following headings:

i) a cultural control; **2**
ii) a **NAMED** biological control; **4**
iii) a **NAMED** chemical control. **4**

Please see over/…..

MARKS

Total Mark

Please turn over/…..

MARKS

Q4 a) Explain how mice develop resistance to chemical control. **4**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Please see over/…..

MARKS

b) State **SIX** Integrated Pest Management strategies to reduce the development of resistance to pesticides. **6**

Total Mark

Please turn over/…..

MARKS

Q5 Describe the management of the spread of the following weeds in a specified horticultural situation, with reference to distinct control methods:

i) a **NAMED** annual weed; **5**
ii) a **NAMED** perennial weed. **5**

Please see over/…..

MARKS

Total Mark

Please turn over/…..

MARKS

Q6 a) Describe the stem and bulb eelworm (nematode) under **EACH** of the following headings:

i) plant symptoms; **4**
ii) survival of pest. **2**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Please see over/…..

	MARKS
b) State **FOUR** control methods for stem and bulb eelworm.	**4**

Total Mark

****

DO NOT USE THIS PAGE

DO NOT USE THIS PAGE

©These questions are the property of the Royal Horticultural Society.
They must not be reproduced or sold.

The Royal Horticultural Society, Wisley, Woking, Surrey GU23 6QB.
Charity Registratio

Including examiner comments

R3103

THE MANAGEMENT OF PLANT HEALTH

Level 3

Wednesday 26 June 2019

Candidates Registered	**99**		**Total Candidates Passed**	**61**	**81%**
Candidates Entered	75	76%	Passed with Commendation	21	28%
Candidates Absent/Withdrawn	22	22%	Passed	40	53%
Candidates Deferred	2	2%	Failed	14	19%

General comments

The majority of candidates attempted and completed all the questions.

A wide range of marks was achieved by candidates taking this paper with some excellent papers and some really poor ones.

Where named plant examples are asked for, **full botanical names were 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 were not credited.
Labels on diagrams needed to be carefully and correctly positioned to avoid ambiguity, not left hanging in mid-air. The labels need to touch the appropriate part of the diagram to be credited. Annotations on diagrams were accepted as an alternative to description in the text as long as these were clear and answered the question. No marks were awarded for artistic merit or for unlabelled diagrams.

Where a number of answers were specified in the question, e.g. 'List **TWO** plant names' or 'Describe **TWO** functions' **only the FIRST TWO answers** given by a candidate were marked.

			MARKS
Q1	a)	Describe the symptoms of ash dieback (Hymenoscyphus fraxineus).	**4**
	b)	State how ash dieback disease spreads.	**2**
	c)	State **FOUR** biosecurity measures to prevent the spread of ash dieback.	**4**

This question was generally answered well.

Q1 a) Some candidates lost marks for answers which were vague or lacking description of symptoms. The question / name of the disease already stated 'dieback' so candidates were required to give additional detail to explain what the symptoms look like. The description should state that the affected trees show extensive dieback of shoots, twigs and branches and trees often have prolific epicormic shoots, also a list of words is not sufficient for a description.

Many candidates stated 'discoloration of the leaf', but didn't state details of the colour. A lot of candidates stated that the leaves were brown, however the classic symptom is black blotches on the leaf base and midrib. The veins and stalks of leaves can be pale in colour, turning brown. The tips of shoots become black and shrivelled and may carry blackened, dead leaves that may look a bit like frost damage. These leaves usually remain wilted on the tree during the growing season and do not drop early.

Many candidates mentioned the lesions which form perennial cankers and can girdle the stem however, many said these cankers were oozing and weeping which is not correct. This may be due to other secondary infections, not Ash dieback. Some candidates gave additional detail of the diamond shaped lesions which showed underpinning knowledge specific to Ash dieback.

Quite a lot of candidates stated that the disease can affect younger / sapling trees and kill them in one growing season.

A few mentioned that if the bark is peeled, the wood underneath has a brownish to grey discolouration.

Very few candidates, if any, mentioned that small white fruiting bodies can be found on blackened leaf stalks.

b) i) The majority of candidates understood that Ash dieback is spread by fungal spores which are wind borne, but a large number stated it is spread by rain splash which is not correct. A small number mentioned that the disease can be spread by spores from fruiting bodies of the fungus produced in leaf litter on fallen leaves.
Fewer mentioned it can be spread through the movement of diseased ash trees and logs or unsawn timber. No candidates mentioned that it can be seed-borne.

ii) Many candidates lost marks on this section on biosecurity measures stating general biosecurity measures or those suitable to prevent the spread of Phytophthora ramorum rather than Ash dieback. It must be understood that Ash dieback spreads via airborne fungal spores so the usual biosecurity measures that would be in place for *P.* ramorum would not work for Ash dieback. Cleaning vehicles and clothing is a good practice but if the spores are transferred on to the ground, they could still be windblown from the site.

The disease should be reported to the Forestry Commission via Tree Alert. A lot of candidates were confused about who it should be reported to and a large number said DEFRA or the Plant Health Agency.

MARKS

A large number of candidates described the use of plant passports and Phytosanitary certificates but failed to understand that since October 2012 there has been a ban on import movement and sale of Ash trees in the UK.

Some candidates mentioned pruning out the infected branches not understanding the whole tree and others in the vicinity would need to be removed and burnt. When mentioning the destruction of trees, it is essential that candidates state how it should be destroyed, i.e. by burning.

.

			MARKS
Q2	Describe the safety requirements for storage of pesticides under the **EACH** of the following headings;		
	i)	security;	**2**
	ii)	stock control;	**2**
	iii)	product separation;	**2**
	iv)	emergency precautions.	**4**

Q2 i) This question was generally answered well. Candidates were familiar with current legislation and requirements that pesticide stores should be locked, with specific hazard warning symbols and access restricted to trained, authorised personnel only.

ii) Most candidates were aware that stock movement should be recorded in and out of the store and that particular attention should be given to ensuring stock does not go out of date or that approval has been withdrawn from its use. There were a lot of comments in answers regarding keeping products in the original container and not removing labels which were not at the required technical level.

iii) Most candidates stated that powdered products should be stored above liquids to prevent cross contamination if a liquid should spill, however very few mentioned that using a bunded shelf would also help to prevent liquids spilling on to other products. A very small number of candidates mentioned keeping oxidising agents in a separate storage area which is also correct.

iv)This was the least well answered section. Many candidates were distracted by descriptions of how the store should be constructed and where it should be located. The examiner was looking for answers which related to emergency procedures which would need to be actioned, for example, the availability of data sheets with information on how to deal with the situation, contact numbers for emergency services, provision of spill kits and fire extinguishers.

		MARKS
Q3	Describe the control methods for vine weevil, stating the targeted life-cycle stage, under **EACH** of the following headings:	
	iv) a cultural control;	**2**
	v) a **NAMED** biological control;	**4**
	vi) a **NAMED** chemical control.	**4**

Q3 This question was generally well answered. It was important for candidates to name the life cycle stage that they were targeting the control for. At level 3 it would be expected that a candidate could use the term ‘larvae’ rather than ‘grubs’.

i) Most candidates were able to describe looking for either larvae in the roots of pot plants or adults on the leaves at night. It is important that on recognition and discovery of either stage the candidate should state how they would destroy it i.e. by squashing.

ii) Most candidates understood that vine weevil larvae can be controlled by parasitic nematodes and the most common example given was Steinernema kraussei. To achieve full marks, it was essential that descriptions were given which included details of how the nematodes are applied to the soil, as a drench, and when they would be applied, August to early September, with reference to soil or growing media temperature, which was dependent on chosen nematode, and the life cycle stage, young larvae. A lot of candidates spent valuable time describing how the nematode kills the larvae but this was not required. A very small number described using Steinernema carpocapsae in a trap for adult vine weevils.

iii) Many candidates were able to achieve full marks for correctly naming chemicals such as Acetamiprid and Thiacloprid as a soil drench applied to control the early larval stage in containers in summer. Those candidates who mentioned trade names or products that are now withdrawn lost marks.

			MARKS
Q4	a)	Explain how mice develop resistance to chemical control.	**4**
	b)	State **SIX** Integrated Pest Management strategies to reduce the development of resistance to pesticides.	**6**

Q4 a) Many candidates have learnt how pesticide resistance builds up in insects and tried to relate this to mice, demonstrating in some cases that they had not studied mice specifically. Those who gained marks were able to demonstrate knowledge that mice have built up a resistance to rodenticides and in particular the use of warfarin as an anticoagulant. They were also able to explain that due to selection pressure and rapid breeding it is possible for a mutated gene conferring resistance to be passed on to large numbers of offspring. A very small number of candidates mentioned the specific genetic mutation involved.

A large number described how mice observe other mice and if one mouse avoids eating the bait the others will do the same. However, this is not how mice develop resistance to rodenticides.

b) Candidates have a good understanding of integrated pest management; however, it is important that when mentioning a particular method, they used an example to support their statement. For example, to state ‘use physical controls and put up a barrier’ does not lead the examiner to know what the barrier is, when or where it would be put up and for what purpose. If selecting biological controls, candidates should state a named pest and predator/parasite, for cultural controls such as using a crop rotation they should state how long for and why would it help.

Examiners were looking for answers which demonstrated a holistic approach to pest control so examples of cultural, physical, biological controls and the use of chemical pesticides as a last resort was required. Also, when selecting pesticides, IRAC codes should be checked so that pesticides with differing modes of action are chosen when planning a spraying programme to reduce resistance.

		MARKS
Q5	Describe the management of the spread of the following weeds in a specified horticultural situation, with reference to distinct control methods:	
	i) a **NAMED** annual weed;	**5**
	ii) a **NAMED** perennial weed.	**5**

Q5 This question was answered well, it was essential for candidates to name a specific situation and those who failed to do so lost marks as the description needed to match the situation. Examiners were looking for a correctly named weed and a description of how it spread with appropriate control methods.

i) As annual weeds are spread prolifically by seed it was expected that candidates should to mention that any method of control should be done before seeds are set. The most common annual weed examples selected were *Poa annua* and *Cardamine hirsuta* (technically an ephemeral). Many candidates described using Glyphosate, a translocated herbicide, to control annual weeds but the use of a named contact herbicide would be more appropriate as Glyphosate would be better used on perennial weeds.

ii) The most common perennial weed examples were *Rumex obtusifolius* and *Calystegia sepium. C. sepium* spreads mainly from sections of underground stem (rhizome) or root. The roots may penetrate up to 5m (16ft) deep or more and spread rapidly, but most growth is from white, shallow, fleshy underground stems. Very small sections of the rhizomes can produce shoots. Appropriate control methods, depending on the horticultural situation stated, included spot treatment with Glyphosate, digging out all stems and roots from the soil and covering the soil with a light-obscuring membrane for two growing seasons.

MARKS

Q6 a) Describe the stem and bulb eelworm (nematode) under **EACH** of the following headings:

i) plant symptoms; **4**
ii) survival of pest. **2**

b) State **FOUR** control methods for stem and bulb eelworm. **4**

Q6 a) i) Candidates gave generally good descriptions of the symptoms and most referred to bulbs, some candidates described symptoms on named plant species giving examples of onions displaying ‘onion blout’ or stating carrots can swell, rot and eventually split. It’s important that descriptions are specific as statements such as ‘poor growth’, ‘stunted growth’ can relate to symptoms caused by many other pests.

ii) The infectious fourth stage juvenile enters plant tissue below ground or can crawl up stems in a film of water to infest the plant. Very few candidates were able to describe that the nematode can survive in the soil for up to two years as the infectious fourth stage juvenile. Most, at best, stated it was able to remain in the soil for many years.

The nematode can also remain viable and spread in seeds as well as bulbs.

b) Candidates’ answers for control methods were generally good. Many candidates mentioned the hot water treatment but lost marks if they didn’t give details of temperature and duration of treatment. Some candidates stated the use of chemicals, however there are no chemicals approved for use on bulbs.

Other suitable controls included the use of crop rotation with a minimum of 4 years’ rotation, removal of infected bulbs and any healthy plants within a 1m radius and destroy by burning. Some candidates stated potential host weeds such chickweed and bind weed should be removed to prevent spread of eelworm into the crop.

©These questions are the property of the Royal Horticultural Society.
They must not be reproduced or sold.

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