Including examiner comments

R3103

THE MANAGEMENT OF PLANT HEALTH

Level 3

Wednesday 7 February 2024

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.

ANSWER ALL QUESTIONS

MARKS

Q1 a) Describe **THREE** distinct cultural controls for rose rust giving the reason for using **EACH** control. **6**

Please see over…..

MARKS

b) Explain why there are different plant protection products available to the domestic gardener and the professional user to control rose rust. **4**

Total Mark

Please turn over/…..

MARKS

Q2 For a **NAMED** horticultural situation describe the pest codling moth under **EACH** of the following headings:

		MARKS
i)	symptoms and damage	**4**
ii)	**THREE** distinct control methods	**6**

i)……

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Please see over/…..

ii)

Total Mark

Please turn over/…..

MARKS

Q3 a) For **ONE** named situation describe the damage and environmental impact caused by the spread of Japanese knotweed**.** **5**

Please see over/…..

MARKS

b) Describe **TWO** chemical control methods for established Japanese knotweed, using **ONE** named approved herbicide. **5**

Total Mark

Please turn over/…..

MARKS

Q4 Describe how biological control is used in Integrated Pest Management for **ONE NAMED** pest. **10**

Please see over/…..

MARKS

Please turn over/…..

Total Mark

MARKS

Q5 Describe clematis wilt under **EACH** of the following headings:

i) symptoms and damage **4**
ii) **THREE** cultural control methods **6**

i)……………………………………………………………………………………………

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MARKS

ii)……

Total Mark

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MARKS

Q6 a) State **THREE** characteristics of dock (*Rumex obtusifolius)* that make it a successful weed. **3**

b) State **TWO** horticultural situations where dock (*Rumex obtusifolius)* can cause problems. **2**

Please see over/…..

MARKS

c) Describe integrated controls for dock (*Rumex obtusifolius).* 5

Total Mark

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			MARKS
		Question	
Q1	**a)**	Describe **THREE** distinct cultural controls for rose rust giving the reason for using **EACH** control.	**6**
	b)	Explain why there are different plant protection products available to the domestic gardener and the professional user to control rose rust.	**4**

Q1. a) Most candidates showed at least a basic understanding of rose rust cultural controls and the reasons for using them with many candidates scoring well on this question.
Spring pruning of infected material and subsequent burning to reduce the spread of spring spores, removing fallen leaves throughout the season and Autumn tidying around the plants to reduce the number of overwintering resting spores were all understood to be methods of controlling the spread of spores through the growing season and winter period respectively, with some candidates discussing the mulching of beds in late Winter / early Spring to reduce the chance of spores being splashed up from the ground by rain. Keeping pruning tools clean and sterilised was highlighted by some candidates and the use of resistant varieties came up in a number of papers with those candidates giving a named resistant variety such as *Rosa* 'Roseraie de l'Hay' gaining a mark.

b) Many candidates missed stating that professional users have access to products unavailable to the home gardener. Very few products are approved for the control of rose rust by the home gardener. Many candidates missed marks for discussion of the requirements placed on professional users such as the regulations from the Chemical Regulation Directorate (CRD) or, other than some very broad points about “need to be trained” or “hold a certificate to apply” being the theme rather than stating that a Pa1 and Pa6 qualification is required, this is very basic information that all candidates should have understood.

			MARKS
Q2		**Question**	

		For a **NAMED** horticultural situation describe the pest codling moth under **EACH** of the following headings: i) symptoms and damage; ii) **THREE** distinct control methods.	 **4** **6**

Q2. Results for this question varied considerably from candidate to candidate with very few gaining high marks.

i) In orchards of apple and pear trees most understood that the codling moth larvae would create damage internally to the fruit and mentioned tunnels, frass and holes in the outside of the fruit although this was often said to be the entry hole rather than the exit hole with very few understanding that there is often no sign of an entry hole as they enter the fruit from the calyx as it is forming. Some gained a mark for discussing secondary rotting around the exit hole or early fruit drop.

ii) Controls were understood reasonably well by some. The best answers highlighted the use of pheromone traps for monitoring, the aim of which is to understand pest levels in order to apply controls; traps are not considered a control method in themselves and discussion of this in reducing numbers of males and therefore mating was not awarded marks. Nematodes were a well-known method of biological control with candidates understanding how, when and where these needed to be applied. Chemical control using the pesticide deltamethrin was also reasonably well understood. The use of grease bands, corrugated carboard or hessian stem wrappings were less often mentioned as a way of trapping the insect; these can then be removed and destroyed by burning.

			MARKS
Q3		**Question**	
	a)	For **ONE** named situation describe the damage and environmental impact caused by the spread of Japanese knotweed.	**5**
	b)	Describe **TWO** chemical control methods for established Japanese Knotweed, using **ONE** named approved herbicide. **Ac 1.2 2.1**	**5**

Q3. a) Candidates generally had a good understanding of the growth of Japanese knotweed and the damage it can cause to both the built and natural environments. Examples given included damage to paving, tarmac and property foundations. It can also block watercourses and drainage channels causing flooding. Some candidates lost marks in the first part of the question where they discussed a problem, such as it is an invasive plant easily spread with no natural pests or diseases, without giving a further description. E.g. "It can outcompete its neighbouring plants" but not qualifying this statement by explanations as to how or why this is the case. The best answers gave a thorough explanation that "due to the fast-growing rhizomes water and nutrients will be taken from the surrounding less vigorous plants especially if they are not as deeply rooted as Japanese Knotweed", or, "because the plant can grow to two metres or more and produces a large amount of leaf it will outcompete smaller plants for light, thus reducing their ability to photosynthesise".

b) For the second part of the question candidates were required to describe two chemical control methods, with a named approved herbicide, which many were able to do with a reasonable level of understanding. Glyphosate was the most commonly mentioned herbicide although others can be used. Better answers included not just how (leaf application by spray or targeted application, or stem injection) but also information about the stage of growth (before stems become too tall, or mature canes), location of application (leaves, or into stem above second node), time of year (Spring / early Summer, or Autumn), and its mode of action (systemic / translocated) and how it works, by entering the plant's vascular system and being transported throughout the entire plants structure both above and below ground.

			MARKS
Q4		**Question:**	

		Describe how biological control is used in Integrated Pest Management for **ONE NAMED** pest.	**10**

Q4. This question asked the candidate to describe how a specific biological control is used as part of an IPM strategy. Two simple marks were available to the candidate; one for the named pest and a second for naming a suitable biological control with its specific epithet.

Candidates were then expected to discuss the use of a biological control as part of an IPM strategy by discussing monitoring of the crop for the pest, when and how this could be done and how monitoring relates to the use of the control around timing of applications and watching for signs that the Economic Damage Threshold was nearing.

Some specific information about the application and use of the named biological control could then have been expected. Many candidates gave details of this. For example, using the nematode *Steinernema kraussei* as a biological control for vine weevil larvae, applied as a soil or container drench in the autumn when the ground is moist and soil temperature is above $5^{O}C$.
Credit was also given to the place that biological control has in the IPM hierarchy of controls, and that the use of biological controls reduces the need for chemical controls and reduces the incidence of pesticide resistance. Any other chemical used to promote the growth or vigour of the plants or crop, would need to be compatible with any biological controls in use.

			MARKS
Q5		**Question:**	

		Describe Clematis wilt under **EACH** of the following headings: i) symptoms and damage ii) **THREE** cultural control methods	 **4** **6**

Q5. i) Clematis wilt symptoms and damage were generally known by the candidates; leaf wilt and blackening, stem collapse and black discolouration of the internal stem, followed by the appearance of new shoots from the base of the plant. However almost all candidates described the discolouration to the leaves and stem as brown, rather than dark brown or black resulting in a reduction in the marks given.

ii)Many candidates were able to discuss three cultural control methods for Clematis wilt and highlighted the need to prune out infected growth to healthy tissue, the use of clean, disinfected tools, destruction of the infected material by burning to stop further spread, the use of resistant species such as *Clematis montana,* and creating a good growing environment with best planting, mulching and watering techniques. Where candidates did not gain good marks, this was due to the limited description given for the control methods.

			MARKS
Q6		**Question:**	

	a)	State **THREE** characteristics of dock (*Rumex obtusifolius)* that make it a successful weed.	**3**
	b)	State **TWO** horticultural situations where dock (*Rumex obtuifolius)* can cause problems.	**2**
	c)	Describe integrated controls for dock (*Rumex obtusifolius).*	**5**

Q6. a) This question was generally answered well with most candidates gaining a good mark. The characteristics of dock that make it a successful weed include:
The deep taproot making it hard to dig out, the regenerative potential from the remaining piece of taproot, large quantities of seed produced per plant (full marks were only achieved for those that stated 50-60,000 seed), and seed longevity of up to 50 years were all well known. The fact that immature seed can continue to develop once cut from the plant was not well known however.

b) In terms of horticultural situations where dock can be a problem, herbaceous borders, shrub borders, vegetable gardens, were all credited. Lawns were stated by a number of candidates; however, this answer was not accepted as the regular cutting keeps dock under control, grasslands or meadows however were accepted as docks have the chance to establish in these situations.

c) Integrated controls for dock were generally well understood and most candidates could provide a range of methods by which it can be effectively controlled along with reasoning as to why the methods would be used.
Cultural controls included remove seedlings by hand weeding before the tap root has chance to establish, digging out and completely removing any mature tap root, preventing dock from seeding by cutting off inflorescences before seed is set and dispersed. Chemical controls for a heavy established infestation included use of systemic herbicide to spot treat docks.

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