Including Examiners Comments

RHS

R3103

THE MANAGEMENT OF PLANT HEALTH

Level 3

Wednesday 22 June 2022

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) State **FOUR** reasons why annual meadow grass (*Poa annua*) is a successful weed. **4**

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b) State **TWO** distinct controls for annual meadow grass (*Poa annua*) for **EACH** of **TWO** different **NAMED** horticultural situations where annual meadow grass can become a problem weed, by completing the table below.

	1.NAMED Horticultural situation	**2.NAMED Horticultural situation**
Control 1		
Control 2		

3

3

Total Mark

Please see over…..

PLEASE TURN OVER

QUESTION TWO CONTINUES OVERLEAF

MARKS

Q2 a) State what is meant by IPM. **1**

b) Describe **THREE** distinct methods of control for Western Flower Thrips (WFT) used as part of an IPM strategy stating the targeted lifecycle stage for **EACH** method. **9**

Please see over/…..

MARKS

Total Mark

Please turn over/…..

MARKS

Q3 a) Identify **THREE** distinct environmental hazards associated with using herbicides. **3**

b) State **THREE** procedures required to minimise risks to a professional operator when using an herbicide. **3**

Please see over/…..

MARKS

c) State the current legislative requirements for the professional operator using herbicides. **4**

Total Mark

Please turn over/…..

MARKS

Q4 a) Describe the symptoms of *Phytophthora ramorum* on:

i) **ONE NAMED** tree species **3**
ii) **ONE NAMED** shrub species **3**

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ii) .....

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b) State **THREE** distinct ways in which *Phytophthora ramorum* can be spread. **3**

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Please see over/…..

MARKS

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c) State what action should be taken when an outbreak of *Phytophthora ramorum* is discovered. **1**

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Total Mark

Please turn over/…..

MARKS

Q5 a) State **TWO** symptoms caused by an infestation of two spotted spider mite on plants. **2**

b) Explain how resistance to chemical pesticides develops in the two spotted spider mite. **6**

Please see over/…..

MARKS

c) Describe **ONE** alternative non chemical control method for two spotted spider mite. **2**

Total Mark

Please turn over/…..

MARKS

Q6 a) State the biological adaptations that enable Japanese knotweed (*Fallopia japonica)* to spread. **4**

MARKS

b) State **SIX** biosecurity measures used to prevent the spread of Japanese knotweed. **6**

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THE MANAGEMENT OF PLANT HEALTH

Level 3

Wednesday 22 June 2022

Candidates Registered	**53**		**Total Candidates Passed**	26	70%
Candidates Entered	37	70%	Passed with Commendation	8	21%
Candidates Absent/Withdrawn	13	24%	Passed	18	49%
Candidates Deferred	3	6%	Failed	11	30%

General comments

Candidates who wrote more detailed answered gained higher marks, fully qualified statements are expected in answer to Level 3 questions.

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.

MARKS

Q1. **a)** State **FOUR** reasons why annual meadow grass (*Poa annua*) is a successful weed. **4**

b) State **TWO** distinct controls for annual meadow grass (*Poa annua*) for **EACH** of **TWO** different **NAMED** horticultural situations where annual meadow grass can become a problem weed, by completing the table below.

	1.NAMED Horticultural situation	**2.NAMED Horticultural situation**
Control 1		
Control 2		

3

3

Q1. **a)** This section was generally well done. Most candidates gave some statement about the large number of seeds that are produced by annual meadow grass but in vague terms such as "many", "lots", "plenty" etc. But a clear indication of "up to 2000 seeds per plant" or a figure close to this was required to gain a full mark. Additional marks were available for a range of answers but the most common given were that annual meadow grass tolerates a wide range of soil conditions, has a short (1 month) life cycle meaning that many generations are produced in a season, seed remans dormant in the soil for many years. Some candidates mentioned that it can be cut as short as 5mm in fine turf but adapt to grow successfully producing flowers and seed on compact stalks to ensure that its life cycle is not interrupted, and fewer commented on the fact that annual meadow grass has an extended season due to continued growth during the cooler part of the year.

Several candidates clearly did not understand that annual meadow grass is an annual with discussion of rhizomatous root systems which it does not have.

b) Due to an error in the formatting of the question paper a wider range of answers was accepted for this part of the question and it was marked on the basis on either the candidate naming two horticultural situations, each with two distinct control measures for annual meadow grass, or, two control measures with each of these having two horticultural situations given.
An example answer for two distinct controls for annual meadow grass in fine turf:

- Dig out patches and reseed with appropriate seed mixture to establish desired sward
- Brush or rake before mowing to raise stems to ensure flowering heads are removed without scalping the lawn

When a herbicide was recommended as a control measure in a named horticultural situation such as garden border or soft fruit area, most candidates suggested Glyphosate, a translocated herbicide, which, whilst it would work is not really necessary. A contact herbicide such as Acetic Acid for example, would be perfectly suited for control of annual weed and when used in a planted situation would be less likely to kill any non-target perennial plants.
The candidates' marks for this question were not as high as could have been anticipated for what was a very basic, straight forward question.

Q2. **a)** State what is meant by IPM. **1**

b) Describe **THREE** distinct methods of control for Western Flower Thrips (WFT) used as part of an IPM strategy stating the targeted lifecycle stage for **EACH** method. **9**

Q2. **a)** Some candidates answered this part of the question by stating what the acronym IPM stands for rather than expanding on what Integrated Pest Management actually means, i.e. The combined use of cultural, physical, biological and chemical controls with the aim of minimising the amount of chemicals used.

b) To gain full marks on this part of the question candidates were required to describe three distinct control measures for Western Flower Thrips. Often three methods were given, but these generally lacked detail, and only a few answers tackled the subject in some depth. There was some confusion over the stage of the life cycle of the insect that was affected by the chosen method.

Credited answers included:

- insect proof netting mesh over windows and vents of glasshouses as a physical control to prevent adults flying in
- Monitoring for presence of adults using sticky blue traps, visual inspection of crop for adults and nymphs and then selecting appropriate control method
- the use of a biological control such as regular introductions of the predatory mite *Amblyseius swirski* which consumes first instar larvae
- cultural control of cleaning the greenhouse out in the winter to remove any weeds, plant debris and overwintering pests in cracks, crevices, this could apply to all stages of life cycle.
- Selection of an appropriate approved pesticide to control larger populations of nymphs or adults using chemical with least potential damage to other beneficial insects.

Each control method had to state which part of the life cycle it acted upon and give a small amount of description as to how, why, when a control should be used. Most candidates fared reasonably well on this question but where points were lost it was because a second strategy was too similar to another in the answer, i.e., Describing the use of two similar biological controls.

Q3. **a)** Identify **THREE** distinct environmental hazards associated with using herbicides. **3**

b) State **THREE** procedures required to minimise risks to a professional operator when using an herbicide. **3**

c) State the current legislative requirements for the professional operator using herbicides. **4**

Q3. **a)** Generally, part a) of the question was reasonably well answered but some utilised hazards to the operator rather than the environment.
Hazards identified included pollution of rivers, streams and other aquatic environments, spray drift onto non target plants, potential contact with pollinating insects, and other wildlife depending on time of spraying.

b) b) was again, generally well answered by many with most candidates offering the required three procedures. These included carrying out a Control of Substances Hazardous to Health (COSHH) assessment, wearing the appropriate PPE, specification of appropriate items of PPE, and other procedures related to personal safety when handling chemicals. However, some of the answers given were more general, such as storing chemicals in a locked store which, whilst this is important, is not specifically operator protection.

c) The third part of the question required an understanding of pesticide management in asking for the legislative requirements for professional users of herbicides and aimed to draw out the candidate's knowledge of the specific legislation and legislative codes such as The Code of Practice for Using Plant Protection Products and the certification requirement for professional operators of PA1, PA6. Control Of Substances Hazardous to Health Regulations is another such regulation, as is Health and Safety at Work Act, and Plant Protection Products (Sustainable Use) Regulations.

Most candidates did not have this knowledge and opted to put information such as "Always read the label" or statements about general handling of chemicals.

Q4. **a)** Describe the symptoms of *Phytophthora ramorum* on:

i) **ONE NAMED** tree species **3**
ii) **ONE NAMED** shrub species **3**

b) State **THREE** distinct ways in which *Phytophthora ramorum* can be spread. **3**

c) State what action should be taken when an outbreak of *Phytophthora ramorum* is discovered. **1**

Q4. **a)**

i) Full botanical names of tree and shrub species needed to be given in answer to this question, along with the specific symptoms of *Phytophthora ramorum* on the chosen host plants. In quite a number of cases the candidate did not provide the full specific epithet of the plants given as hosts, this meant that half marks were only given for this. Colouration of leaf symptoms was incorrectly described as blackening by some candidates when in fact leaves will turn brown, often starting at the petiole or around the outside edge of the leaf blade a point which was often not described.
For example, symptoms of *P. ramorum* on *Larix decidua* would include, needles becoming purple or black and falling prematurely, shoots wilt and dieback, bleeding cankers can occur on trunks, stems and side shoots.

ii) Again, candidates lost marks for only providing a Genus name although symptoms of *P. ramorum* seemed to be slightly better known for shrubs. On *Rhododendron ponticum* brown spreading lesions develop on leaves spreading down the main vein of the leaf giving a V-shaped appearance, and lesions or cankers may form on twigs or stems, where the internal tissues turn brown, and wilting and dieback follows.

Some candidates confused *P. ramorum* and the symptoms for Armillaria (Honey Fungus).

b) Most candidates understood that rain splash was a factor in the spread of this disease, from diseased to healthy plants. Other methods of spread included transport in contaminated soil on boots and vehicle tyres, and transport of infected plants from one site to another.

c) Most candidates recognised that someone needed to be advised of this notifiable disease but many did not provide the correct organisation for this. The Animal and Plant Health Agency (APHA) are the organisation to contact in England.

Q5. **a)** State **TWO** symptoms caused by an infestation of two spotted spider mite on plants. **2**

b) Explain how resistance to chemical pesticides develops in the two spotted spider mite. **6**

c) Describe **ONE** alternative non chemical control method for two spotted spider mite. **2**

Q5. **a)**

Most candidates were able to give at least one symptom of two spotted spider mite with the majority giving either the fine silk webbing found on the plants or, the yellow mottling of the upper surface of leaves. Full marks were given for specific detail. Some candidates gave generic statements such as "reduces vigour" which was not credited.

b)

Many candidates did not score very well on this section of the question.

There is a limited range of pesticides approved for control of two spotted spider mite. It is not clear whether candidates understand that if any of the population is left after initial spraying, that the individuals would reproduce, and should repeated poor spraying with the same pesticide or ones with the same mode of action occur subsequently, this selection pressure and multiple short life cycles of the mite then allows a resistant population to rapidly build up which has resistant genes to the mode of action of the chemical. Thereafter the population will not be controlled by that group of pesticides and one with another mode of action needs to be used.

Very little discussion was given about the quality of application of pesticides, the droplet size, ensuring the correct water volume, timing of application and how these may allow spider mite with limited tolerance to survive, creating selection pressure which then builds resistance.

c)

Most candidates could give one suitable non-chemical controls for Spider Mite but interestingly only *Phytoseiulus persimilis,* a predatory mite was given as a biological control. Other biological controls are also effective including *Amblyseius californicus,* also a predatory mite, *Feltiella acrarsuga* a predatory midge and *Atheta coriaria* a rove beetle (both adults and larvae will feed on a wide range of invertebrates)

Many candidates understood that increased humidity was a good method of control, but few went on to say that it would not provide complete control. No comments were made about alternative methods of reducing the population by removal and destruction of infested crops by burning.

Q6. **a)** State the biological adaptations that enable Japanese knotweed (*Fallopia japonica)* to spread. **4**

b) State **SIX** biosecurity measures used to prevent the spread of Japanese knotweed. **6**

Q6. **a)** This question was generally well answered with candidates having a reasonable understanding of how Japanese Knotweed survives and spreads very quickly as a result of its biological adaptations which are:

- thick fleshy rhizomes that grow deep and spread wide whilst also being an efficient method of reproduction from very small pieces.
- Fleshy rhizomes are an effective storage vessel for the nutrients over the winter period, enabling the plant to make strong growth early in the year
- Rapid annual growth allows it to out compete other plants for both light and moisture.
- Robust strong shoots can push through compacted ground and concrete
- Crown of the plant when dug up is able to survive drying or composting producing new canes when in contact with soil or water

b) Biosecurity measures seemed to prove a little more difficult for candidates to clearly identify, however most understood some basics such as needing to employ the services of a licensed contractor for the removal of waste from site as it is classed as Hazardous material or that it should be burned on site, ideally after 24 hours or drying to ensure an efficient burn, but nobody highlighted that this is a licenced activity.
Most candidates highlighted that it is illegal to propagate Japanese Knotweed or allow it to spread outside of your property, be that to a neighbouring garden, or in the wild. Surprisingly, the prevention of transfer of propagules on footwear or vehicle tyres etc was not raised by any candidate, nor related hygiene measures such as cleaning footwear, equipment, vehicles between sites, restricting access, parking on hard standing. Any screened soil must not be re-used off site but kept within the original site.

Many candidates incorrectly highlighted plant passporting and stock inspections control methods, neither of which should be required as the plant should not be imported anyway or be found in new stock.

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