HM Government

T-LEVELS

T Level Technical Qualification in Agriculture, Land Management and Production (Level 3)

Theory Exam Paper 2:
Crop, Woodland and Horticulture Core Pathway

Sample mark scheme

September 2023 v2.1

City & Guilds

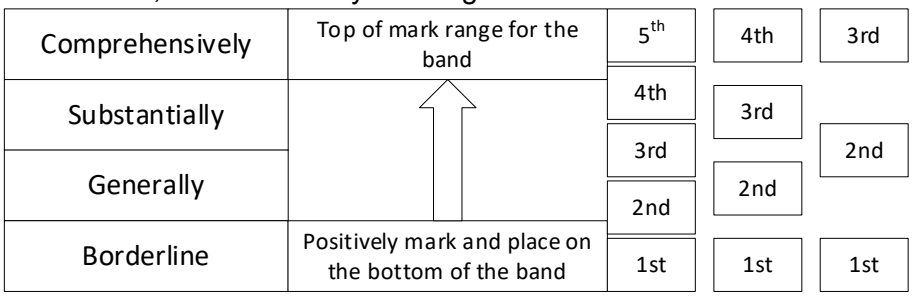
Marker guidance

Unless otherwise stated in the marker guidance for a specific question, the following conventions apply:

- All marking, from start to finish must be consistent and in line with the mark scheme guidance. Continue to refer to the mark scheme throughout marking.
- For questions that ask for a specific number of points, accept the first answers given up to the number requested eg State three… only accept the first three answers listed, and disregard any additional answers provided.
- For questions requiring continuous prose answers, mark positively – all correct answers should receive the appropriate mark according to the mark scheme. Any wrong (**but neutral**) answers should be ignored, and no marks should be lost.
- In some circumstances, it is appropriate to disallow a candidate answer that initially appears to give the correct answer as given in the mark scheme, if it is undermined by the fact that it goes on to actively **contradict** its intention. Sometimes the minimal wording used in the mark scheme allows a match that in reality is trivial and it is clear the candidate is referring to the wrong knowledge/understanding. Only the part of the response to which the contradiction applies should be disallowed, not the whole response. Material that is irrelevant/neutral but not contradictory should be ignored and positive marking applied as above.
- Use the full range of marks for a question as described by the mark scheme – eg for a 2-mark question, 0, 1 or 2 marks will always be available to award (never just 0 or 2). For levels marking, the full range of marks should be used freely as described by the mark scheme including 0 and full marks.
- Always award whole marks; half marks cannot be awarded.
- Allow phonetic misspellings as long as the meaning is clear, ie not so similar to another relevant but wrong term that you have to guess which was intended.
- Only allow 'it' as reference to the question topic if it is clear what 'it' refers to.
- Mark crossed out work **unless** it has been replaced by another response.
- Where judgement is required, apply the guidance. Where the guidance does not sufficiently support for a particular candidate response/interpretation, contact your Team Lead.
- Accept alternative wording that reflects what is given in the mark scheme.
- Contact your Team Lead if any additional correct answers arise which need to be added to the mark scheme.
- For level of response mark schemes:

  Note: indicative content has been provided to help orient the marking, providing a sense of the intentions of the question and expected parameters of the response. It is not exhaustive, and candidates do not need to cover all points referenced. Candidates may provide good quality responses while taking an approach which legitimately focuses either on breadth or depth given the time constraints. While the best responses are more likely to go to some depth across a broader range, there will be acceptable variation. Any pointers in the question towards coverage eg '…a range of…' should be kept in mind and balanced, through professional judgement, as to how much this affects the overall quality of the response when applying the marking instructions.

- First, read the full candidate response and decide which band descriptor best fits the overall level of quality of the response, in the context of the indicative content.
- Then, to decide on a mark within the band, consider the ***degree to which*** **the response fits the criteria**, as indicated by the diagram below:



The table below provides further detail on the descriptors used within each of the mark bands and what is expected at each level. Use the descriptors below alongside the mark scheme to support accurate and consistent judgment of candidate's response and allocation of marks.

AO2	**AO3**
Basic	
Limited understanding that is relevant to the context or question. Limited accuracy in interpretation through lack of application of relevant knowledge and understanding.	Limited accuracy in analysis through lack of application of relevant knowledge and understanding. Unsupported evaluation through lack of application of knowledge and understanding. Unsupported judgement through lack of application of knowledge and understanding.
Good	
Some understanding that is relevant to the context or question. Some accuracy in interpretation through the application of some relevant knowledge and understanding.	Some accuracy in analysis through the application of some relevant knowledge and understanding. Partially supported evaluation through the application of some relevant knowledge and understanding. Partially supported judgement through the application of some relevant knowledge and understanding.
Thorough	
A range of accurate understanding that is relevant to the context or question. Accurate interpretation through the application of relevant knowledge and understanding.	Accurate analysis through the application of relevant knowledge and understanding. Supported evaluation through the application of relevant knowledge and understanding. Supported judgement through the application of relevant knowledge and understanding.
Comprehensive	
A range of detailed and accurate understanding that is fully relevant to the context or question. Detailed and accurate interpretation through the application of relevant knowledge and understanding.	Detailed and accurate analysis through the application of relevant knowledge and understanding. Detailed and substantiated evaluation through the application of relevant knowledge and understanding. Detailed and substantiated judgement through the application of relevant knowledge and understanding.

This exam has been split into **two** sections.

Below details the types of questions and marks available for each section. Please allow time for each section accordingly.

Section A is made up of **44** marks and includes **14** short answer and medium answer questions.
Section B is made up of **36** marks and includes **3** extended response questions.

Assessment Objectives	Mark allocation
AO1a Demonstrate knowledge The ability to demonstrate recall of relevant knowledge in response to straightforward questioning.	**10%**
AO1b Demonstrate understanding The ability to explain principles and concepts beyond recall of definitions, but in a general way – ie out of a particular context in response to straightforward questioning.	**15%**
AO2 Apply knowledge and understanding to different situations and contexts Using and applying knowledge and understanding, taking the understanding of generalities and applying them to specific situations. Questions are likely to ask for application in relation to a straightforward situation.	**45%**
AO3a Analyse information and issues Complex thinking that distinguishes patterns and relationships, breaking material into constituent parts, and determining how the parts are related to one another and holistically, inferring underlying assumptions/conditions/relevance/causation.	**30%**
AO3b Evaluate information and issues The ability to make judgements about the value, for some purpose, of own or others' work/ideas/solutions/methods using internal or external criteria or standards relevant for the occupational area. These criteria may include eg quality, accuracy, effectiveness, efficiency, coherence, consistency, and may be quantitative or qualitative.	

Section A

Q1	Disposal is a method of managing waste using the waste management hierarchy. Identify **two** other methods from the waste management hierarchy. (2 marks)	
Mark Scheme	• Prevention (1) • Preparing for re-use (1) • Recycling (1) • Other recovery (1)	**Marking guidance** Award **1 mark** for each correct method up to a maximum of **2 marks.**
Total marks	2	
AO	AO1a	
Qual spec reference	2.1 Waste management principles in the crop production, trees and woodland, and horticulture and landscaping sectors.	

Q2	State **two** functions of a root. (2 marks)	
Mark Scheme	• Anchorage (1) • Absorption (1) • Perennation (1)	**Marking guidance** Award **1 mark** for each correct function up to a maximum of **2 marks.** Credit any other appropriate response.
Total marks	2	
AO	AO1a	
Qual spec reference	5.1 The physical structures of plants and their functions.	

Q3	State **two** roles of the Plant Health and Seeds Inspectorate. (2 marks)	
Mark Scheme	• To implement and enforce plant health policy (1) • To contain and quarantine plant/seed pests (1) • To secure high-quality planting material (1) • To facilitate trade through the provision of plant health certification (1) • To inspect imported plants/seeds, planting produce and material (1)	**Marking guidance** Award **1 mark** for each correct role up to a maximum of **2 marks.** Credit any other appropriate response.
Total marks	2	
AO	AO1a	
Qual spec reference	3.1 Principles of biosecurity in the crop production, trees and woodland, and horticulture and landscaping sectors.	

Q4	a) Define what is meant by the terms 'direct competitors' **and** 'indirect competitors' in a business context. (2 marks) b) You are a supplier of compost mixes for planting material. Give **two** examples of what your indirect competitors could supply. (2 marks)	
Mark Scheme	**Part a)** • Direct competitors target the same customer group and sell the same product/service (1) • Indirect competitors offer product/service that are not the same but could satisfy the same customer need (1) (2 marks) **Part b)** • The constituent parts of the compost mix (1) • Alternative growing methods/media (1) • Farmyard manure (1) • Topsoil (1) (2 marks)	**Marking guidance** **a)** Award **1 mark** for each correct meaning up to a maximum of **2 marks**. **b)** Award **1 mark** for each correct example up to a maximum of **2 marks**. Credit any other appropriate response.
Total marks	4	
AO	a) AO1a – 2 marks b) AO2 – 2 marks	
Qual spec reference	4.1 Principles of supply chains in the crop production, trees and woodland, and horticulture and landscaping sectors. 4.2 Principles of stock management in the crop production, trees and woodland, and horticulture and landscaping sectors.	

Q5	Give **two** examples of the benefits of educating the public on plant biosecurity. (2 marks)	
Mark Scheme	• Increase vigilance for new pests/diseases (1) • Sourcing certified clean pest/disease free material (1) • Reporting any trees/plants suspected of having notifiable pests/diseases (1) • Not bringing back plant material from abroad (1)	**Marking guidance** Award **1 mark** for each correct benefit up to a maximum of **2 marks**. Credit any other appropriate response.
Total marks	2	
AO	AO1b	
Qual spec reference	3.1 Principles of biosecurity in the crop production, trees and woodland, and horticulture and landscaping sectors.	

Q6	Explain **one** reason why different types of waste materials should be identified prior to disposal. (2 marks)	

Mark Scheme	• To categorise potential hazards so that the appropriate waste disposal method is put in place (1)
	  ○ to reduce environmental impact (1)
	  ○ **or** to put in place specific actions for dealing with them (1)
	  ○ **or** to minimise/avoid the risk to operators/general public of waste handling (1)
	
	• To use the correct licensed waste disposal contractors to ensure legal disposal (1) to avoid risk of prosecution (1)
	
	• To look for the potential of generating income from the waste products which reduces costs of disposal (1) making waste management self-funding (1)
		Marking guidance
		Award **1 mark** for a basic explanation, and **1 further mark** for a developed explanation, to a maximum of **2 marks**.
		
		Award a maximum of **2 marks** for **one** reason that is fully explained.
		
		Credit any other appropriate response.

Total marks	2	
AO	AO1b	
Qual spec reference	2.1 Waste management principles in the crop production, trees and woodland, and horticulture and landscaping sectors.	

Q7	Explain **one** method which ensures safe storage of hazardous chemical liquids. (2 marks)	
Mark Scheme	• Keep the liquid in a locked chemical store that can be accessed by authorised personnel (1) which restricts access and misuse (1) • Store the liquid below any cardboard packaged/dry materials in case of leaks/spills (1) which would potentially cause contamination/pollution/chemical reaction with the dry materials (1)	**Marking guidance** Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, to a maximum of **2 marks**. Award a maximum of **2 marks** for **one** method that is fully explained. Credit any other appropriate response.
Total marks	2	
AO	AO1b	
Qual spec reference	4.2 Principles of stock management in the crop production, trees and woodland, and horticulture and landscaping sectors.	

Q8	Explain **one** reason why a business would lease rather than purchase machinery and equipment. (2 marks)	
Mark Scheme	• Satisfy demand for seasonal machinery/equipment (1) whilst avoiding out of season storage costs (1) • To enable regular replacement of new machinery (1) to avoid the need for a large capital sum at purchase (1) • To test new technology (1) without commitment to ownership (1) • To spread costs over a period of time (1) to enable known costs for budgeting (1)	**Marking guidance** Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, to a maximum of **2 marks**. Award a maximum of **2 marks** for **one** reason that is fully explained. Credit any other appropriate response.
Total marks	2	
AO	AO1b	
Qual spec reference	4.2 Principles of stock management in the crop production, trees and woodland, and horticulture and landscaping sectors.	

Q9	Explain **two** methods for establishing information about existing customers to expand the customer base. (4 marks)	
Mark Scheme	• GDPR compliant survey to get information/use existing sales data on customer's buying patterns (1) to find opportunities to expand the range of products/services (1) • Analyse data to calculate the number of existing customers as a proportion of market share (1) to assess the feasibility of targeting new customers in the same market (1) • Analyse customer characteristics to identify related market segments (1) offering potential for expansion/diversification (1)	**Marking guidance** Award **1 mark** for each basic explanation, and award **1 further mark** for each developed explanation, to a maximum of **2 marks**. Award a maximum of **4 marks** for **two** methods that are fully explained. Credit any other appropriate response.
Total marks	4	
AO	AO1b	
Qual spec reference	4.1 Principles of supply chains in the crop production, trees and woodland, and horticulture and landscaping sectors.	

<table>
<tr><td>Q10</td><td colspan="2">The environmental control system in a propagation facility has a malfunction on regulation of temperature and light.

a) Explain one potential impact of the temperature malfunction on the physical processes of seed germination.

(2 marks)
b) Explain one potential impact of the light malfunction on the physical processes of the seedlings.

(2 marks)</td></tr>
<tr><td>Mark Scheme</td><td>Part a)
• Too low a temperature for activating the seed enzymes (1) resulting in failure of germination to take place (1)

• Overheating of the air/compost leading to compost drying out (1) and preventing the seeds taking up water (1)

Part b)
• Lack of light reduces photosynthesis (1) resulting in poor plant growth/low production of nutrients (1)

• Too little light leads to etiolation (1) resulting in a weaker/spindly plant (1)

• Too much light causes scorching of leaves (1) resulting in a loss of photosynthetic ability (1)</td><td>Marking guidance
a) Award 1 mark for a basic explanation, and award 1 further mark for a developed explanation, to a maximum of 2 marks.

Award a maximum of 2 marks for one potential impact that is fully explained.

Credit any other appropriate response.

b) Award 1 mark for a basic explanation, and award 1 further mark for a developed explanation, to a maximum of 2 marks.

Award a maximum of 2 marks for one potential impact that is fully explained.

Credit any other appropriate response.</td></tr>
<tr><td>Total marks</td><td colspan="2">4</td></tr>
<tr><td>AO</td><td colspan="2">AO2</td></tr>
<tr><td>Qual spec reference</td><td colspan="2">5.2 Physical processes involved in plant growth.</td></tr>
</table>

Q11	Explain how **one** method mitigates against excessive transpiration from newly planted hedges. (2 marks)	
Mark Scheme	• Mulching after planting minimises surface water loss (1) from the soil by evaporation (1) • Installing protection minimises air flow (1) and so reduces water evaporation from the leaves (1) • Firming in the hedging plant to effectively consolidate soil/minimise large air spaces around the roots (1) to enable the root hairs to be in contact with water (1)	**Marking guidance** Award **1 mark** for a basic explanation, and award **1 further mark** for a developed explanation, to a maximum of **2 marks**. Award a maximum of **2 marks** for **one** approach that is fully explained. Credit any other appropriate response.
Total marks	2	
AO	AO2	
Qual spec reference	5.2 Physical processes involved in plant growth.	

<table>
<tr><td>Q12</td><td colspan="2">A busy site has a level delivery area next to the main storage building, which has overhead utility supplies.

A risk assessment must be completed for the receipt of plants which are delivered in a heavy goods vehicle. The delivery will be made by an external company and unloaded by the delivery vehicle’s driver using their own forklift truck.

The receipt of a delivery of plants is a hazard.

In Table 1, explain two risks to staff for this hazard with one appropriate control measure for each risk.

The control measure must relate to the risk to staff.

(4 marks)</td></tr>
<tr><td>Mark Scheme</td><td>Risk - How might staff be harmed:
• Staff injured by collision/contact/crushing with the moving vehicle (1)
What control measure is necessary:
• Signage warning staff of moving vehicles to avoid the area (1)
• Staff wearing high visibility clothing/PE so that they can be easily seen (1)
• Marked walkways to separate staff from vehicle movement area (1)

Risk - How might staff be harmed:
• Ill health/loss of hearing caused by emissions/noise pollution from the vehicle’s engine (1)
What control measure is necessary:
• Ensure engine is switched off when not moving to reduce the risk (1)
• Use appropriate PPE/ear protection (1)
• Use lower emission/electric vehicle to substitute the risk (1)

Risk - How might staff be harmed:
• Electrocution from low/exposed overhead cables due to delivery vehicle/forklift truck hitting/breaking overhead cables because of its height (1)
What control measure is necessary:
• Signage of a designated driving area/route/height barrier to avoid overhead cables (1)
• Staff directing the vehicle (banksman) to avoid overhead cables (1)</td><td>Marking guidance
Award 1 mark for each risk up to a maximum of 2 marks.

Award 1 mark for each control measure up to a maximum of 2 marks.

Marks must only be awarded for control measures that directly relate to the risk given by the candidate.

Credit any other appropriate response.

Candidate answers will be provided on Table 1 on the question paper.</td></tr>
<tr><td>Total marks</td><td colspan="2">4</td></tr>
<tr><td>AO</td><td colspan="2">AO2</td></tr>
<tr><td>Qual spec reference</td><td colspan="2">1.1 Hazards, risks and control measures associated with working in the crop production, trees and woodland, and horticulture and landscaping sectors.</td></tr>
</table>

Q13

The estate is replacing its old storage for chemical plant protection products with a new purpose-built store which meets all relevant requirements.

The stock of chemical plant protection products hasn't been checked for at least a year so waste management principles must be considered.

Explain the actions the estate manager should take when planning to relocate the stock into the new purpose-built store.

(6 marks)

Mark Scheme

Band	Marks	Descriptor
3	**5-6**	Demonstrates thorough application of knowledge and understanding of managing the different types and classifications of waste materials. Reasoning for the actions is highly detailed and relevant.
2	**3-4**	Demonstrates good application of knowledge and understanding of managing the different types and classifications of waste materials. Reasoning for the actions is mostly detailed and relevant.
1	**1-2**	Demonstrates basic application of knowledge and understanding of managing the different types and classifications of waste materials. Reasoning for the actions has limited detail and relevance.
	0	**No relevant material**

Indicative content

Actions

- Undertake a risk assessment to identify hazards and risks of relocating the stock, to support identifying and implementing appropriate control measures, for example PPE.
- Stock-take existing store to identify the products, including their types, classifications and quantities, check for expired products and any hazardous products to ensure appropriate management.
- Review the risk assessment based on stock-take findings, for example leaking products, disposal of expired stock, to ensure all risks are identified.
- Implement control measures to reduce risks to personnel eg manual handling training, provision of appropriate PPE, ensure availability of spillage kits.
- Ensure appropriate, safe storage: in original containers where containers are intact and appropriately labelled; need to assess condition of the storage containers which are old and could be damaged; retain original labelling information, update and replace labels where required.
- Plan storage and transport in a responsible manner in order to maintain safe working environment eg inaccessible to unauthorised personnel, protected from theft and weather.
- Ensure storage and disposal methods and facilities comply with the Code of Practice for Plant Protection Products.
- Plan and manage secure methods of transport: stability of containers, PPE and

	handling, complies with the Code of Practice for Plant Protection Products. • Plan for contingencies to deal with hazards and risks associated with transportation for example spillages during transport, spill kits, evacuation plan. • Explore support for disposal costs/amnesty/recycling from local licensed waste disposal companies for unwanted products, and to comply with legislation. • Ensure plans comply with environmental legislation: eg Environmental Protection Act, Plant Protection Products (Sustainable Use) Regulations. • Ensure stock taking records are completed at the end of the process and on a regular basis (eg 6 monthly) to comply with legislation and enable monitoring of expiry dates. • Ensure paperwork associated with the disposal and/or transfer of the chemical plant protection products (eg waste transfer notes) is completed at the end of the process to comply with legislation.
Total marks	6
AO	AO2
Qual spec reference	2.1 Waste management principles in the crop production, trees and woodland, and horticulture and landscaping sectors.

Q14

Japanese knotweed (*Reynoutria japonica)* has been identified on a site which is located immediately next to a housing development.

Explain the implications that the **landowner** should consider.

(6 marks)

Mark Scheme

Band	Marks	Descriptor
3	**5-6**	Demonstrates thorough application of knowledge and understanding of the implications of common invasive plant species and associated legislation. Reasoning for implications that the landowner should consider is highly detailed and relevant.
2	**3-4**	Demonstrates good application of knowledge and understanding of the implications of common invasive plant species and associated legislation. Reasoning for implications that the landowner should consider is mostly detailed and relevant.
1	**1-2**	Demonstrates basic application of knowledge and understanding of the implications of common invasive plant species and associated legislation. Reasoning for implications that the landowner should consider has limited detail and relevance.
	0	**No relevant material**

Indicative content

Implications

- Japanese knotweed is classed as a controlled plant under the Wildlife and Countryside Act 1981 so must be treated as an invasive plant:
  - Requirement to control from spreading:
    - According to DEFRA guidance you must stop Japanese knotweed on your land from spreading off your property so the landowner must take action.
    - Although it is not a legal obligation to remove Japanese knotweed off your land if it's not causing a nuisance, you can be prosecuted for causing it to spread into the wild.
  - Landowner needs to consider likelihood of spread to adjacent land, eg where the plant is positioned on their land, how it spreads (small pieces can regrow).
  - Legal action from the owner of the adjacent land (housing development) is a possibility.
  - Significant cost for managing the plant (on the site and particularly if it spreads into the housing development) because Japanese knotweed is classed as 'controlled waste' under the Environmental Protection Act 1990 so would need to be managed under this classification eg removal, storage, disposal, use of land.
  - What the future risks/concerns are. eg
    - Even the slightest piece of Japanese knotweed can still regrow, so it is very costly to effectively remove all trace of the plant.
    - Devalues site as an asset because can't build on the site without

	extensive (costly and time consuming) mitigating measures; value is reduced from potential building land. ▪ Managing perception of the risk in light of current methods which can effectively control the plant.
Total marks	6
AO	AO2
Qual sec reference	2.3 Common invasive plant species and associated legislation.

Section B

Q15	A plant production facility which imports plant material has discovered an insect in a consignment that it has received from outside the UK. The insect has been identified by the Animal and Plant Health Agency as a notifiable, non-native pest. Analyse the potential impacts on the plant production business of finding the insect pest and justify actions to take to manage these impacts. (12 marks)

Mark Scheme

Band	Marks	Descriptor
4	**10-12**	Demonstrates comprehensive application of knowledge and understanding of biosecurity principles and plant health legislation in relation to the impacts on the plant production business and actions to manage the impacts. Demonstrates comprehensive use of analysis of potential impacts on the plant production business in relation to the requirements of biosecurity principles and plant health legislation. Demonstrates comprehensive evaluative skills by justifying an excellent range of actions to manage these impacts. Justifications are supported with highly detailed and relevant reasoning.
3	**7-9**	Demonstrates thorough application of knowledge and understanding of biosecurity principles and plant health legislation in relation to the impacts on the plant production business and actions to manage the impacts. Demonstrates thorough use of analysis of potential impacts on the plant production business in relation to the requirements of biosecurity principles and plant health legislation. Demonstrates thorough evaluative skills by justifying a good range of actions to manage these impacts. Justifications are supported with mostly detailed and relevant reasoning.
2	**4-6**	Demonstrates good application of knowledge and understanding of biosecurity principles and plant health legislation in relation to the impacts on the plant production business and actions to manage the impacts. Demonstrates good use of analysis of potential impacts on the plant production business in relation to the requirements of biosecurity principles and plant health legislation. Demonstrates good evaluative skills by justifying a moderate range of actions to manage these impacts. Justifications are supported with some detail and relevant reasoning.
1	**1-3**	Demonstrates basic application of knowledge and understanding of biosecurity principles and plant health legislation in relation to the impacts on the plant production business and actions to manage the impacts.

		Demonstrates basic use of analysis of potential impacts on the plant production business in relation to the requirements of biosecurity principles and plant health legislation. Demonstrates basic evaluative skills by justifying a limited range of actions to manage these impacts. Justifications are supported with minimal detail and relevant reasoning.
	0	No relevant material

Indicative content

Analysis

Potential impacts on the business of managing the notifiable, non-native insect pest:

- The insect pest must be considered differently from a native or established pest because of the risks eg spreading into the native wild plant populations and wider environment, Spreading into nurseries which produce the same plant materials as the importing plant production facility:
  - Requirement to notify authorities of the details of the presence of the pest; additional restrictions may be imposed by the authority.
  - Restrictions to movement, sale and disposal of the infected plant material.
  - Consideration of the Plant Health Act 1967 (and amendments) which requires specific actions eg management of disposal by an external contractor if the insects are found on the plants, cost of disposal of plant material which will impact on profit, waiting for them to act, storage in the meantime.
  - Risks from distribution before pest noticed and identified (spreading, reputational impact).

- Some impacts are common with the treatment of native pests:
  - Cost and safety implications of treating the pest: impact on profit, time to do, how ensure it has been successful. Most insect pests are harmless to humans.
  - Impact on reputation because of affected plants; drop in sales.
  - Need to shut down or restrict access to all plant materials; takes up storage space.
  - Costs of biosecurity measures to keep stock isolated from other materials, and ensure other stock is not infected.
  - Expense of replacing stock; impact on profit and staff time, additional cost for reassurance of bio security (passports, additional inspections).
  - Delay whilst wait for replacements to arrive: impact on reputation with existing customers, leading to loss of trust and impact on future sales.
  - Reputational impact which could lead to loss of business: expense, time, risk to reputation, compensation/replacement.

Justifications of actions to manage the impacts of the notifiable, non-native insect pest

- Quarantine the batch of plant material, not just visibly affected plant materials to avoid and control the spread of the insect pest (internal and external):
  - Regular monitoring/reporting to observe possible spread, and control and manage the risk.
- Immediately contact the Animal and Plant Health Agency to report the details of the imported pest because this is a legal requirement (Plant Health Act 1967).

	• Pest control/spraying to kill the insect pest to control it/reduce spread. Health & Safety legislation requirements must be met (eg COSHH, Pesticide Application Certificate of Competence), and relevant chemical safety data should be observed. • If the plant is significantly damaged destroy the plant to save on the resources used to maintain the plant. • If the plant is otherwise healthy it can be grown on for efficient use of business resources. • Arrange disposal of affected plants by an external contractor where necessary to ensure compliance with legislation. • Notify customers who may have been affected, in order to comply with legal requirements. • Undertake publicity activities to restore customer confidence, ensure business and reputation can be maintained. • Undertake promotional activities to increase sales and compensate for lost business. • Consider temporary or partial business closure to manage the situation and provide customer confidence in how the situation is being dealt with. • Follow contingency planning to source alternative supplier(s) who may be able to deliver direct to customers. • Storage and handling to reduce the risk of spreading the insect pest: o Comprehensive inspection to assess the scale of the pest infestation. o Review quarantine procedures to ensure these remain compliant and able to cope with the scale and possible range of situations. o Employ and continually review hygiene practices: disinfection, personal, stores, equipment, staff training. o This increases costs to the business which the business will have to absorb. • Transportation: to reduce the risk of spreading the insect pest: o Inspection of transport – hygiene and disinfection before loading and leaving the plant production facility. • Sourcing reliable (clean) replacement plant materials to continue running the business. • Staff training to become aware and be able to recognise and identify any new pests, to ensure continuous monitoring of plant materials and awareness of potential issues.
Total marks	12
AO	AO2 – 4 AO3a – 4 AO3b – 4
Qual spec reference	3.1 Principles of biosecurity in the crop production, trees and woodland, and horticulture and landscaping sectors. 3.2 Key responsibilities under plant health legislation and regulations.

Q16

Following several dry summers an outdoor producer is investigating what they can do to reduce the effects on future plant establishment and growth.

Analyse the potential effects of the dry summers on plant physiological processes throughout a plant's establishment and growth.

Justify which types of plant life cycle could provide the best future plant yield in a dry summer.

(12 marks)

Mark Scheme

Band	Marks	Descriptor
4	**10-12**	Demonstrates comprehensive application of knowledge and understanding of plant physiological processes and types of plant life cycles in relation to the effects of dry summers on plant yield. Demonstrates comprehensive use of analysis of plant physiological processes throughout a plant's establishment and growth in relation to the effects of the dry summers. Demonstrates comprehensive evaluative skills by considering the characteristics of different types of plant life cycles. Justifications are supported with highly detailed and relevant reasoning.
3	**7-9**	Demonstrates thorough application of knowledge and understanding of plant physiological processes and types of plant life cycles in relation to the effects of dry summers on plant yield. Demonstrates thorough use of analysis of plant physiological processes throughout a plant's establishment and growth in relation to the effects of the dry summers. Demonstrates thorough evaluative skills by considering the characteristics of different types of plant life cycles. Justifications are supported with mostly detailed and relevant reasoning.
2	**4-6**	Demonstrates good application of knowledge and understanding of plant physiological processes and types of plant life cycles in relation to the effects of dry summers on plant yield. Demonstrates good use of analysis of plant physiological processes throughout a plant's establishment and growth in relation to the effects of the dry summers. Demonstrates good evaluative skills by considering the characteristics of different types of plant life cycles. Justifications are supported with some detail and relevant reasoning.

1	**1-3**	Demonstrates basic application of knowledge and understanding of plant physiological processes and types of plant life cycles in relation to the effects of dry summers on plant yield. Demonstrates basic use of analysis of plant physiological processes throughout a plant's establishment and growth in relation to the effects of the dry summers. Demonstrates basic evaluative skills by considering the characteristics of different types of plant life cycles. Justifications are supported with minimal detail and relevant reasoning.
	0	No relevant material

Indicative content

Analysis of the potential effects of dry summers on the physiological processes

- Lower levels of water availability in the soil would result in decreased germination rates due to less water being available, reducing imbibition and subsequent seedling development.
- Lack of water would reduce establishment of a plant and cause uneven germination.
- The growth/yield of the plant would be reduced as lower water and nutrient uptake would result in decreased leaf area for sunlight, and growth deformities.
- There would be a reduced function of the physical structures of the plant, with lower photosynthetic rates leading to reduced plant yield.
- If limited water is available it would lead to less soluble nutrients available for growth, and therefore reduced plant yield.
- Plants may adapt their root structure to grow deeper, leading to more effective uptake of water and nutrients.
- If too hot the plant will transpire more and wilt due to lack of water to counter water lost through transpiration.
- When the roots are unable to take up sufficient water, the leaves will wilt (loss of turgor). Transpiration rates would be lower because the leaves have wilted, stomata are closed and there is less leaf area exposed to the sun.
- Reduced water availability would increase stress on the plant and vulnerability to pest and disease attack, and weed incursion.

Justification of how each type of life cycle could provide the best future plant yield in a dry summer

- Perennial – once established it will have a more developed root system and be able to access water and soluble nutrients which biennials and annuals can't; will have future years to recover. This is particularly relevant to the second and subsequent years. In the first year, the plant will have comparable growth to annual plants. It is improbable that there will be any yield in the first year, depending on the plant variety.
- Biennial – have a second growing season, bigger, stronger plants than annuals in the second year, with better root systems. In the first year, the plant will have comparable growth to annual plants. A plant may be grown for yield in the first

	year, so the same issues as for annual plants would apply. • Annual – a dry summer would probably have the most severe impact on a plant with this type of lifecycle because the plant has only one growing season to develop. Note: It isn't expected that ephemerals are included in the response because ephemerals are not used for high plant yield.
Total marks	12
AO	AO2 – 4 AO3a – 4 AO3b – 4
Qual spec reference	5.2 Physical processes involved in plant growth. 5.3 The life cycle of plants. 5.4 Growth and development of plants.

Q17

You have been asked to supervise cleaning up a building after river flooding has occurred.

The enclosed, single storey building is used for the storage of machinery. The flooding lasted two days, reaching a maximum height of one metre. The river's water level has dropped to normal levels.

Analyse the potential hazards and associated risks of the clean-up and justify actions to prepare for the clean-up.

(12 marks)

Mark Scheme

Band	Marks	Descriptor
4	**10-12**	Demonstrates comprehensive application of knowledge and understanding of potential hazards, associated risks and required actions in relation to the clean-up after the river flooding the building. Demonstrates comprehensive use of analysis of the potential hazards and associated risks in relation to the requirements of the clean-up. Demonstrates comprehensive evaluative skills by justifying an excellent range of actions to prepare for the clean-up. Justifications are supported with highly detailed and relevant reasoning.
3	**7-9**	Demonstrates thorough application of knowledge and understanding of potential hazards, associated risks and required actions in relation to the clean-up after the river flooding the building. Demonstrates thorough use of analysis of the potential hazards and associated risks in relation to the requirements of the clean-up. Demonstrates thorough evaluative skills by justifying a good range of actions to prepare for the clean-up. Justifications are supported with mostly detailed and relevant reasoning.
2	**4-6**	Demonstrates good application of knowledge and understanding of potential hazards, associated risks and required actions in relation to the clean-up after the river flooding the building. Demonstrates good use of analysis of the potential hazards and associated risks in relation to the requirements of the clean-up. Demonstrates good evaluative skills by justifying a moderate range of actions to prepare for the clean-up. Justifications are supported with some detail and relevant reasoning.
1	**1-3**	Demonstrates basic application of knowledge and understanding of potential hazards, associated risks and required actions in relation to the clean-up after the river flooding the building.

		Demonstrates basic use of analysis of the potential hazards and associated risks in relation to the requirements of the clean-up. Demonstrates basic evaluative skills by justifying a limited range of actions to prepare for the clean-up. Justifications are supported with minimal detail and relevant reasoning.
	0	No relevant material

Indicative content

Analysis

Potential hazards and risks created by the flooding or applicable to the clean-up:

- Damage to building structure: injury through loose building materials.
- Standing water: consequent risk of slips, transmitted infections (Weil's disease).
- Damage to services (above and below ground) due to high water eg shorted electrics, consequent risk of fire/explosion, electrocution, lack of heating/water, power cuts, gas fumes.
- Damage to machinery due to high water making the machinery unsafe to operate or move eg water ingress causing damage to eg brake systems, electrical systems etc.
- Debris and pollution: trips, falls, personal injury, environmental damage.
- Sewage contamination: transmission of infections, environmental damage.
- Fuels and oils: stored (ground and raised/shelving), damaged containers resulting in released fluids.
- Removing water and debris: transportation and disposal: environmental damage, personal injury (lifting), slips, trips and falls.
- Use of unfamiliar cleaning machinery and equipment: incorrect operation resulting in personal injury and damage to building, insufficient PPE, inappropriate equipment.
- Chemicals used in cleaning: burns, damage due to inhalation, insufficient PPE.

Justified actions to prepare for clean up

Overarching requirement (legislation) is to ensure there are no adverse environmental impacts caused by the clean-up operation:

- Assess the situation and identify the consequences of the flooding: damage to buildings, location/condition of services, what was originally in the building:
    - Identify what needs to be removed, what needs to be cleaned and left in-situ to inform the action plan and risk assessment eg machinery (safe use/movement for servicing/maintenance as a result of damage by water ingress), fuels and oils (disposal of contaminated fluids, replace containers if damaged).
    - Prepare action plan to consider all the requirements of the clean-up, and the appropriate order of work. Includes timing, cleaning, drying, routes for removal/disposal, communication, first aid, staff decontamination area.
    - Create a site and situation specific risk assessment to identify appropriate control measures.
- Resource control measures so that all is readily available when needed: sufficient PPE, machinery and equipment, only trained staff using machinery/equipment.

	• Hire/borrow specialist machinery and equipment which may be more quickly available than purchasing, limiting the cost to the business. • Manage access to the area and keep people safe. • Inform and train workforce as appropriate: brief those involved in the clean-up (risk assessment, how to work safely), other staff need to know what is happening, eg areas to avoid. Training about procedures and use of equipment. • Isolate/switch off services if safe to do so, or contact utility providers (specialists) due to risk of electrocution/fire/explosion.
Total marks	12
AO	AO2 – 4 AO3a – 4 AO3b – 4
Qual spec reference	1.1 Hazards, risks and control measures associated with working in the crop production, trees and woodland, and horticulture and landscaping sectors. 1.2 Procedures to follow when dealing with emergency situations.

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