T Level Technical Qualification in Agriculture, Land Management and Production

Crop Production Occupational Specialism

Guide Standard Exemplification Material Distinction – Sample April 2024

Version and date	Change detail	Section
November 2023 v1.0		
April 2024 v1.1	Photo evidence added to task 4a and text amended to reflect the photos. Quantified weeds in task 4a	Task 4

Contents

Introduction

The sample evidence within this document refer to the Crop production Occupational Specialism assignment. The aim of these materials is to provide centres with examples of knowledge, skills and understanding that attest to a distinction grade.

The evidence presented here has been developed to reflect a distinction grade within each task but is not necessarily intended to reflect the work of a single candidate. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and the standard of performance will vary across tasks. The Guide Standard Exemplification Material (GSEM) illustrates linear performance across all pieces of evidence at the grade. A distinction grade will be based on a synoptic mark across all tasks.

The evidence in this GSEM is separated into the sections as described below. Evidence is presented against tasks from the assignment. Assessors using the GSEM may find it helpful to review this document along with the sample assessment materials.

Task
This section details the evidence to be submitted for marking and any additional evidence required including any photo/video evidence. Also referenced in this section are the performance outcomes and assessment themes the evidence will be marked against when completing the tasks within it. In addition, evidence that has been included or not been included in this GSEM has been identified within this section.

In this GSEM there is evidence from:

- Task 1
- Task 2
- Task 3
- Task 4
- Task 5

Evidence
This section includes exemplars of evidence, photo/video recordings of the evidence in production (or completed) and assessor observation records of the assessment completed by centre assessors. This will be exemplar evidence that was captured as part of the assessment and then internally marked by the centre assessor.

The items of evidence included in the GSEMs are designed to illustrate the grade at evidence level. They are not intended to reflect the performance of a single candidate across the assignment. Not all items of evidence are included in the GSEM, however a representative sample of evidence from across the assignment has been included to sufficiently illustrate the standard of performance expected for each type of evidence.

Commentary

This section includes detailed comments to demonstrate how the evidence attests to the standard of distinction.

It is important to note that the commentary section is not part of the evidence or assessment but are evaluative statements on how and why that piece of evidence meets a particular standard.

Grade descriptors

To achieve a distinction, a candidate will be able to:

Demonstrate excellent level of performance that fully meets industry requirements, demonstrating strong technical skills and techniques to safely carry out work to high quality standards and efficiently within time constraints.

Carry out practical tasks to a high industry standard, applying excellent knowledge and understanding of establishing, managing and harvesting field-based and container-based crops, and maintaining the surrounding area to achieve excellent standards of crop yield and quality.

Clearly identify and work within all relevant environmental and health and safety legislation and regulations, taking the initiative to identify and mitigate potential risks prior to commencing tasks.

Undertake excellent preparation of machinery and equipment to safely carry out tasks, applying comprehensive control measures during tasks.

Present detailed, relevant information in appropriate records, such as field and storage records.

Apply excellent, relevant knowledge and understanding of financial records and information, markets, and methods of promotion to make appropriate decisions.

Consistently use technical terminology accurately.

Task 1 – Field-based crop establishment and assessing a crop for harvest

Task 1a) Assess a field-based crop in preparation for harvest

Evidence contributes to the following:

Performance outcome	Assessment themes
PO4 Harvest crops for commercial markets	Assessing a crop for harvest

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
crop assessment in preparation for harvest	PO4: Assessing a crop for harvest	√		√
assessor observation			√	√
photos		√	√	√

Candidate evidence - crop assessment in preparation for harvest and photos

Date:	20/10/22
Crop type and variety: (Provided by assessor)	Forage maize
Field name:	Six
Sample location:	Two places on two rows, representative of overall crop. (Photo 1)
Assessment of cob maturity:	Using fingernail test: grain is ripe; twisted grain. (Photo 2)
Number of plants sampled:	Four
Fresh weight of sample:	1.6 kg (4 plants)
Sowing rate: (Provided by assessor)	Plant population: 100,000 seeds/hectare
Estimated yield calculation: (Based on current crop maturity)	*(Show calculation)* fresh weight yield/hectare: = fresh weight yield of four plants/4 x 100,000 = (1.6 kg/4 x 100,000)/1,000 = 40t/ha note: leaves were holding a small amount of water from recent rain
Current conditions: (Crop, ground and weather)	**Crop:** Eyespot identified on lower leaves (photo 3). **Ground/soil:** waterlogged **Weather:** windy (no rain forecast for one week)
Decision with justification: (Whether to harvest, including explanation of how photos represent the findings)	Ready for harvest due to cob maturity; twisted cob does not impact readiness (photo 2). Eyespot is only on lower leaves, so harvest should be completed before it spreads. Ground conditions are too wet to harvest in some parts (eg gateway) risking damage to the soil structure (photo 4). Monitor weather and revisit in 3 days to see if wind has dried the ground enough.

Photo/video evidence:

- photos that can be used to support the findings.

Photo 1 (candidate) Sample location

Photo 2 (candidate) Cob maturity

Photo 3 (candidate) Eyespot on leaves

Photo 4 (candidate) Ground conditions

Commentary

The candidate provided a comprehensive, relevant record of their **assessment of the crop for harvest**: their approaches to the task are clearly and accurately recorded, for example taking a total of four plants from two rows to give a representative sample, and an accurate calculation which shows their working. Technical terminology is accurately used eg ‘Eyespot’ identified, ‘waterlogged’ ground.

The candidate has shown excellent understanding of **crop assessment** by including relevant supporting photos for their analysis, including twisted grain and identification of the Eyespot infection.

The candidate applied their excellent understanding to justify detailed and appropriate decisions, including a balanced evaluation of the Eyespot infection and ground conditions to decide on delaying the harvest until the ground conditions improve.

Assessor evidence – assessor observation and photos

Task	Assessment component number
1a) Assess a field-based crop in preparation for harvest	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO4: Assessing a crop for harvest

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	**Notes –** *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• Collection and assessment of the crop sample.	The candidate reviewed the area before they decided where to take samples from. They took four samples in total to give a representative sample of the crop from two adjacent rows. They safely used secateurs to cut the samples at the correct height that was comparable to the height of a forager's cut. They wore gloves when handling the plants (photo 1).
• Calculation of the yield.	They used the scales correctly to weigh (photo 2) the fresh weight of each sample, which they correctly recorded and included in their calculation. Note: the plants were positioned on the scale without resting on the table.
• Disposes of waste appropriately.	They disposed of the waste material (samples) by placing them onto a heap of farmyard manure.
• The candidate's findings must reflect the **actual** status of the crop.	Their record on the *Crop assessment in preparation for harvest* form reflected the actual conditions. They correctly assessed and recorded: • the crop has reached maturity • identification and location of Eyespot • the crop's readiness for harvest: waterlogged ground, weather conditions, and forecast.

Assessor signature	**Date**
Sample Assessor	20/10/22

Photo/video evidence

- Photos:
    - collection and assessment of the crop sample: cutting, weighing.

Photo 1 (assessor) Cutting crop sample

Photo 2 (assessor) Weighing crop sample

Commentary

The candidate took an excellent representative sample for their **assessment of the crop for harvest**: considering the area and then deciding where to take the samples from, taking a total of four samples from adjacent rows. The candidate worked safely throughout the task, for example when handling the secateurs and wearing gloves when handling the plants.

The candidate used an appropriate method, secateurs, to cut the samples at a comparable height to a forager. This gave them an excellent representation of an average harvested crop, and so excellent accuracy in the yield calculation.

Task 1b) Plan a field-based crop

Evidence contributes to the following:

Performance outcome	Assessment themes
PO2 Establish crops in field and container-based systems for optimum yield and quality	Preparing for field-based crop establishment
	Field-based crop establishment

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
report	PO2: Preparing for field-based crop establishment PO2: Field-based crop establishment	√		√
assessor observation	PO2: Preparing for field-based crop establishment		√	√
photos			√	√

Candidate evidence - report

(Word count: 415)

The plan is to sow winter wheat in October.

Germination test percentage

A germination test was carried out using a random sample of the seed available for sowing. This was carried out by accurately planting 100 seeds into a growing medium (multi-purpose compost). After one week the number of established seeds was counted and the result was calculated to be 96% germination.

The calculation used is as follows:

> Number of seeds germinated / number of seeds sown x 100 = germination %
> (96/100 x 100 = 96%)

Using 100 seeds in the germination test made the calculation simpler: number of seeds germinated = % germination.

Planting density

The thousand grain weight provided for the winter wheat seed is 55g.

The required plant establishment for October sowing is 325 plants per m^2. Allowing for an average of 25% field losses over winter, this should equate to approximately 240 plants per m^2 surviving at the beginning of March. (325-25%=243.75)

To calculate the seed sowing rate, the calculation is as follows:

> Target plant establishment (plants per m^2) x thousand grain weight / germination = sowing rate in kilograms per hectare (kg/ha)
> (325 x 55/96 = 186.2)

After rounding, the required seed sowing rate is 186kg/ha.

Seedbed requirements (tine cultivation)

For an autumn sown crop of winter wheat, the seedbed requirements are medium soil particles and moist ground conditions. The seedbed needs to be even, there must be adequate seed to soil contact, and the soil structure must be protected during any cultivation and sowing. Winter wheat is usually sown in rows, with a spacing of approximately 125mm to 150mm between the rows (depending on the type of drill).

Following the sowing of wheat into a medium tilth, the seedbed is consolidated with a Cambridge roller to break up any larger lumps of soil, to help with seed to soil contact and to ensure moisture is retained to help with successful germination. This can also help reduce slug activity.

Sowing depth

The optimal drilling depth for the winter wheat seed is at 25mm to 40mm depending on seedbed conditions at the time of sowing. If the seed is planted too deep, it will lead to

weaker plants at emergence. In this case, the seedling has enough water, but uses a lot of time and energy until it reaches the surface. If the seed is planted too shallow, there is a risk that the seedlings will dry out. In addition, soil applied (pre-emergence) herbicides can cause damage in the autumn.

Commentary

The candidate applied their excellent knowledge and understanding of **preparing for and undertaking field-based crop establishment** to produce a comprehensive, clearly presented report. The candidate used accurate technical terminology throughout, for example, growing medium, soil particles and tilth.

The candidate worked methodically, applying the germination test results to their calculation of the planting density, ensuring an excellent potential crop yield. The candidate's careful measurements (counting seeds, counting germinated seeds), realistic estimation (winter field losses) and detailed calculations produced accurate information without errors.

The candidate comprehensively recorded the relevant seedbed requirements, applying their understanding of **field-based crop establishment** to consider the cultivation technique and the sowing requirements of this crop, ensuring an excellent potential standard of crop establishment.

Assessor evidence – assessor observation and photos

Task	Assessment component number
1b) Plan a field-based crop	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO2: Preparing for field-based crop establishment PO2: Field-based crop establishment

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• Prepare equipment and germinating media. • Accurately count and place 100 seeds.	A seed tray was over-filled with multi-purpose compost, and then struck-off with the edge of a presser board. It was then pressed down evenly to create an even, level surface 1cm below the top of the tray (photo 1). The surface of the compost was watered evenly using a watering can with a fine rose resulting in a suitable amount of water being applied. 100 wheat seeds were randomly selected from the seed batch (photo 2). Plastic forceps were used for the selection and placing of the seed and appropriate force was used to avoid any damage to the seed (photo 3). They were individually placed on the surface of the compost in rows (photo 4). Following placement of the seeds, a further count took place to ensure the correct number (100) had been selected. 1cm of compost was added with use of a sieve to evenly cover the seeds. The surface of the compost was watered evenly using a watering can with a fine rose; a suitable amount of water was applied. The seed tray was labelled and placed in a clear plastic bag, which was placed in a safe area. The daily temperature of the room was confirmed as 17°C-20°C. It was confirmed that this temperature range would be consistent throughout the 7-day germination test period.

	Further watering of the compost took place after day 4. This was carried out by the college technician.
• Following germination count the germinated seeds to work out seed viability.	After 7 full days, the emerged seedlings were counted. Any un-emerged seedlings were also checked to see if the seed had chitted and was still viable. The candidate knew where to look because they had sown in rows. The following calculation was used to establish the germination %: Number of seeds germinated / number of seeds sown x 100 = germination %

Assessor signature	**Date**
Sample Assessor	20/10/22 & 27/10/22

Photo/video evidence

- Photos:
  - count of seeds
  - the seed tray showing the level of the growing media
  - the completed tray showing the evenness of sowing.

Photo 1 (assessor) Seed tray showing the level of the growing media

Photo 2 (assessor) Count of seeds

Photo 3 (assessor) Sowing the seeds

Photo 4 (assessor) Completed tray showing the evenness of sowing

Commentary

The candidate applied an excellent understanding of **preparing for field-based crop establishment** to efficiently undertake the germination test to a high standard. The candidate's careful and detailed preparation resulted in representative germination. For example, the candidate created a level surface and took care not to damage the representative sample of seeds by using forceps. The forceps enabled accurate placement of the seeds, although the candidate could have placed equal quantities of seed in each row.

The candidate's careful and thorough counting at sowing and post-germination gave them accurate, reliable and representative data to use in their calculations and report. For example, checking the non-emerged seedlings was manageable because the candidate had sown in rows.

Task 1c) Establish a field-based crop

Evidence contributes to the following:

Performance outcome	Assessment themes
PO2 Establish crops in field and container-based systems for optimum yield and quality	Preparing for field-based crop establishment
	Health and safety in field-based crop establishment
	Field-based crop establishment

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
risk assessment	PO2: Health and safety in field-based crop establishment	√		√
field record	PO2: Field-based crop establishment	√		√
assessor observation, including Q&A	PO2: Preparing for field-based crop establishment PO2: Health and safety in field-based crop establishment PO2: Field-based crop establishment		√	√
photos			√	√
videos			√	√ (part i only)

Candidate evidence – risk assessment

Candidate's name	Sample Candidate	Enrolment number	CG12345
Task/Activity	1c) Establish a field-based crop	Location	Centre training area
Assessor's name	Sample Assessor	Date	20/10/2022

Item no.	What are the hazards?	Who might be harmed and how?	What precautions are already in place?	Risk rating (High/ Medium/ Low)	What further action is necessary?	Action by who and when?	Residual risk rating (High/ Medium/ Low/Trivial)
1	Cultivation and sowing machinery and equipment.	Self and others. Entanglement/ contact with machinery and equipment eg when adjusting the drill.	All guards complete and in place. Use of PPE (safety boots, non-snag clothing, gloves). Safe stop and exit procedures to follow when leaving cab.	Medium	Create agreed exclusion area in field during operation.	Candidate and assessor. Prior to starting work.	Low
2	Handling treated seed.	Self. Skin contact with seed treatment. Inhalation of dust/vapour. Heavy bag of seed.	Wear PPE (gloves and dust mask). Manual handling training applied eg heavy bags of seed.	Medium	Stand up wind of the seed when filling the drill. Keep PPE in separate locker/out of cab (away from food & tools).	Self. Ongoing.	Low
3	Ground conditions (slopes).	Self. Overturn/loss of control – leading to injury.	Avoid slope. Keep to level area as agreed with assessor.	Low	None	Self. Ongoing.	Low
4	Other workers in the field (students).	Self and others. Entanglement/ contact with	Exclusion area for working in.	Medium	Good observation – stop task if anyone enters the exclusion area.	Self. Ongoing.	Low

		machinery and equipment.					

Date of assessment: 20/10/2022	Risk assessment carried out by: Sample Candidate

Commentary

The candidate completed a comprehensive risk assessment which would keep themselves and others safe, showing an excellent understanding of the requirements of **health and safety in field-based crop establishment**, and the relevant legislation. For example, identifying specific PPE.

The candidate applied their excellent understanding of field-based crop establishment to consider the task and identify the relevant hazards and risks. The risk assessment was completed with an excellent understanding of the difference between hazards, risks and control measures, and correctly categorised risk ratings. For example, the candidate recognised multiple risks of handling treated seed and provided appropriate precautions for each.

The candidate identified a range of detailed precautions to minimise the risks, making clear links between the risks and suitable control measures eg wearing PPE, following specified training.

The candidate considered further control measures that could be applied to reduce the risk ratings. For example, the candidate included actions which should be taken as part of their continual safe working, such as keeping PPE away from food.

Technical terminology was accurately used eg ‘manual handling’ rather than ‘lifting’.

Candidate evidence – field record

Candidate's name	Sample Candidate	Enrolment number	CG12345
Task/Activity	1c) Establish a field-based crop	Location	Centre training area
Assessor's name	Sample Assessor	Date of assessment	20/10/2022

Field name/number/ID: No. 4	**Area (ha.):** 12.2ha	**Harvest Year:** 2023
Current Crop: Winter Wheat (Feed)	**Variety:** PGA Wynn	**Seed dressing:** Blue Moon (single purpose dressing)
Purchased seed lot number (if applicable): 22/2H/123/4567	**Home saved seed (if applicable):** N/A	**Cultivation method:** Tine cultivator and Power harrow
Sowing date: 20/10/2022	**Seed rate:** 175 kg/ha	**Seed depth:** 30mm (average)
Comments: Good seedbed conditions (medium tilth) and consistent coverage of seed post-drilling. Adequate moisture present. Field will be rolled on 21/10/2022 and then a pre-emergence herbicide applied.		

Commentary

The candidate completed a comprehensive field record, showing an excellent understanding of how to present detailed, relevant information for **field-based crop establishment**. All sections have been completed in detail, including information provided by the assessor and detailed comments on the conditions at the time of sowing.

Assessor evidence – assessor observation, Q&A, photos and video

Task	Assessment component number
1c) Establish a field-based crop	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO2: Preparing for field-based crop establishment PO2: Health and safety in field-based crop establishment PO2: Field-based crop establishment

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• Pre-use checks and set-up (cultivator and drill or combination drill).	The required PPE was worn throughout all activities, including safety boots (all activities), non-snag coveralls (when attaching the combination drill), gloves (when required) and a dust mask (when required). The following **pre-use checks** were carried out to the combination drill: • power harrow tines and carriers (photo 1) • coulters and coulter pipes (photo 2) • land wheel to metering unit drive shaft (photo 3) • gearbox oil • drill 'A' frame connection • fan belts (photo 4) • rear roller bearings • drill marker measurements (when lowered) • overall condition of machine.
• Calibration (drill only or combination drill).	The **calibration** for the winter wheat seed was carried out as follows: • correct calculation was carried out to determine the seed required for 1/10ha (amount to be collected during calibration) • land wheel drive (metering unit end) was disconnected • calibration handle connected • flexible fan unit connection was removed to allow access to collect seed

	• calibration chart was interpreted to give a 'base' kg/ha setting for the feed roller opening, and this was set accordingly • bucket was checked for cleanliness and put underneath the feed roller outlet in preparation for collecting any seeds that exit the feed roller during priming • feed rollers were primed to ensure all flutes were full of seed • bucket was attached to weigh scale; scale was set to zero with the bucket attached • bucket was placed back underneath the feed roller outlet in preparation for collecting seed • calibration handle was turned 85 full rotations (photo 5) to deliver the required seed for 1/10ha. All seed was collected in the bucket (no spillages) • bucket of seed was weighed (photo 6). The seed was returned to the drill hopper (photo 7) • feed roller opening was adjusted to feed slightly more seed (indicated by heavy weight of collected seed), and the process repeated • after second calibration the result was as required for 1/10ha • seed was returned to the hopper • flexible fan unit was reconnected, calibration handle removed, and land wheel drive reconnected.
• Attachment (cultivator only or combination drill).	The combination drill was **attached** to the tractor as follows (video & photos): • check of all linkages and PTO shaft for condition and security – visual and physical • linkage spacing was measured and checked for compatibility with the tractor lower links (video time: 0:19) • tractor lower link arms were measured to check they were at equal lengths • protective PTO stub cover was removed • tractor was started and carefully reversed to align with the implement. Lower links were aligned and connected in one move (time: 1:00) • tractor was exited in the correct direction with the engine left running to facilitate use of external linkage controls • lower link connections were visually checked, and then external linkage controls were used to lift the arms to connect to the implement lower linkage. A safe position for operation of external controls was observed (time: 1:45) • lower links safety catches were connected (photos 8 & 9), followed by connection of the hydraulic top link (photo 10) • hydraulic connection was checked for cleanliness, cleaned, and inserted into the tractor hydraulic connection (photo 11) • tractor was stopped, the key removed and placed into the candidate's pocket • PTO shaft was connected, and safety chain attached (photo 12)

	• good all-round observation by the candidate was noted during all machinery operation.
• Use of machinery including accuracy of driving, efficient operation and post-use checks for 3 passes and 2 turns (both cultivator and drill (both cultivator and drill, for 3 passes and 2 turns for the combination drill). • Cultivation depth including required adjustments. • Sowing depth including required adjustments. Tramlining does not need to be assessed.	The in-field **use of the combination drill** was observed as follows: • candidate asked the required seed depth; confirmed as 30mm by the assessor • implement depth and lift height were set. The appropriate gear was selected to give a forward speed (at 1000rpm PTO speed) of 4.5kph • land wheel was carefully moved to 'work position' • drill control box was checked to ensure the tramlining function was turned off. Following this the combination drill was raised slightly (to make sure the power harrow tines and coulters were clear of the ground). PTO was engaged to full working speed (1000rpm) to enable the fan to function at the full required speed • air supply to each coulter was checked using a long cane with a small piece of plastic cable tied to the end. This enabled all coulters to be accessed from behind the drill without the candidate being close to the raised drill or power harrow • land wheel was turned slightly to ensure seed was coming out of the coulters • PTO was disengaged, and the implement lowered to the ground. The external controls (hydraulic top link) were used to ensure the combination drill was level • PTO was engaged to full working speed and the first pass was started. Correct bout marker was lowered into work • after approx. 10 metres the tractor forward motion and PTO was stopped but the implement not raised. They checked the level of the implement 'in work' and made a small adjustment by shortening the hydraulic top link (photo 13) • cultivation depth was checked, and no adjustments were made to the power harrow rear roller depth stops or clod board height • seed depth was checked with a measuring tape, and it was identified that the seed was being drilled too deep. The coulter pressure handle was adjusted in the correct direction to reduce depth • implement was lifted, and the PTO engaged to full working speed. The tractor was reversed approximately 3 metres and the combination drilling recommenced • after approx. 10 metres the same procedure as above was followed to check machine level, cultivation depth and seed depth. No further adjustments were made to the seed depth as it was approximately 30mm deep (photos 14) • combination drilling recommenced using the same procedure as above • passes were correctly matched by following the centre mark created from the previous pass. They were sitting centrally in the seat and aligning the centre of the bonnet with the bout mark • lifting/lowering of the implement was carried out at the correct points at the turns. Turns were efficiently made

• Safely park the machinery and equipment. • Undertake post-use checks to the machinery and equipment.	Following use of the combination drill, the machinery and equipment was parked in an appropriate place and the safe stop procedure followed. A post-use visual check of both tractor and combination drill was carried out. The combination drill was checked: • power harrow tines and carriers (photo 15) • coulters and coulter pipes (photo 16) • land wheel to metering unit drive shaft • overall condition of machine.

Responses to questions	***Notes*** *– detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• What are the responsibilities of the employer and the employee under current health and safety regulations and legislation relevant to the preparation and use of machinery for crop establishment?	**Employer:** Prevent risks to health. Make sure that machinery and equipment is safe to use. Make sure safe working practices are set-up and followed. Make sure that all machinery and equipment is handled, stored, and used safely. Provide suitable PPE. **Employee:** Follow instructions and work in a safe way as instructed. Report any problems and damage to machinery. Take care of their own health and safety and that of others who may be affected by their actions at work. Workers must co-operate with employers and co-workers to help everyone meet their legal requirements.
• Name and describe two relevant pieces of health and safety legislation in relation to the preparation and use of machinery for crop establishment.	**Provision and Use of Work Equipment Regulations (PUWER).** Machinery and equipment are safe to use and maintained in a safe condition. Machinery and equipment must be inspected at suitable intervals to check for any damage. Machinery and equipment must only be used according to the specific conditions that it is suited to and by someone who has been trained. **Control of Substances Hazardous to Health (COSHH)** is the law that requires employers to limit exposure to substances that are hazardous to health. Employers are required to implement procedures to control the exposure of employees to the substances that are hazardous to health. Examples used for crop establishment machinery are fuel and lubricants. Seed dressings are also hazardous to health.
• Why is it important for you to follow the regulations and legislation?	So that operator and all others are kept safe. So that the employer can rectify problems/damage, to avoid unnecessary damage to machinery which creates costs.

• Explain how to limit damage to soil structure during cultivation and drilling.	Working in the correct conditions (soil condition, weather), knowing when not to cultivate or drill, compatibility of machinery power to equipment, correct speed, correct gear, set-up (tyre pressures, machinery settings such as depth).
• How can soil structure be improved between crops?	Adding organic matter (eg straw chopping, green crops, catch cropping, cover cropping, manure, slurry, lime), sub-soiling (breaking up plough pans), mole ploughing, regenerative farming (crop rotation).
• Explain the establishment stage of the winter combinable cereal crop in relation to its lifecycle.	When planted at the correct depth, the seed contacts the soil and moisture to start the germination process. The radical (start of root system) germinates first, then the root system establishes. The next part is shoot emergence (plumule). Following emergence, photosynthesis will start. The warmer the soil, the sooner emergence will happen (usually from 7 days).

Assessor signature	**Date**
Sample Assessor	20/10/22

Photo/video evidence

- Photos:
  - pre-use checks and set-up (both pieces of machinery/combination drill)
  - calibration (drill/combination drill only)
  - collecting and weighing the seed
  - attachment (cultivator/combination drill only – connections)
  - cultivation depth
  - sowing depth
  - post-use checks (photos of what the candidate is checking).
- Videos:
  - i) attachment (cultivator only/combination drill – reversing) – typically 2-3 minutes video is a separate file: Task 1c assessor video - preparing machinery (D).mp4
  - ii) accuracy of driving for a minimum of 1 pass and 1 turn (condition of ground) – typically 2 minutes each (cultivator and drill/combination drill).

Note: some video evidence has been taken using a drone to provide a clear overhead view of the standard of work by the candidate. Where video evidence is required by City & Guilds for live assessments, the use of a drone is not required.

Pre-use checks and set-up

Photo 1 (assessor) Pre-use checks: power harrow tines and carriers

Photo 2 (assessor) Pre-use checks: coulters and pipes

Photo 3 (assessor) Pre-use checks: land wheel drive shaft

Photo 4 (assessor) Pre-use checks: fan belts

Calibration, **collecting and weighing the seed**

Photo 5 (assessor) Calibration: turning calibration handle

Photo 6 (assessor) Calibration: weighing seed

Photo 7 (assessor) Calibration: putting seed back into hopper

Attachment

Photo 8 (assessor) Attachment: LH lower link

Photo 9 (assessor) Attachment: RH lower link

Photo 10 (assessor) Attachment: top link

Photo 11 (assessor) Attachment: hydraulic connections

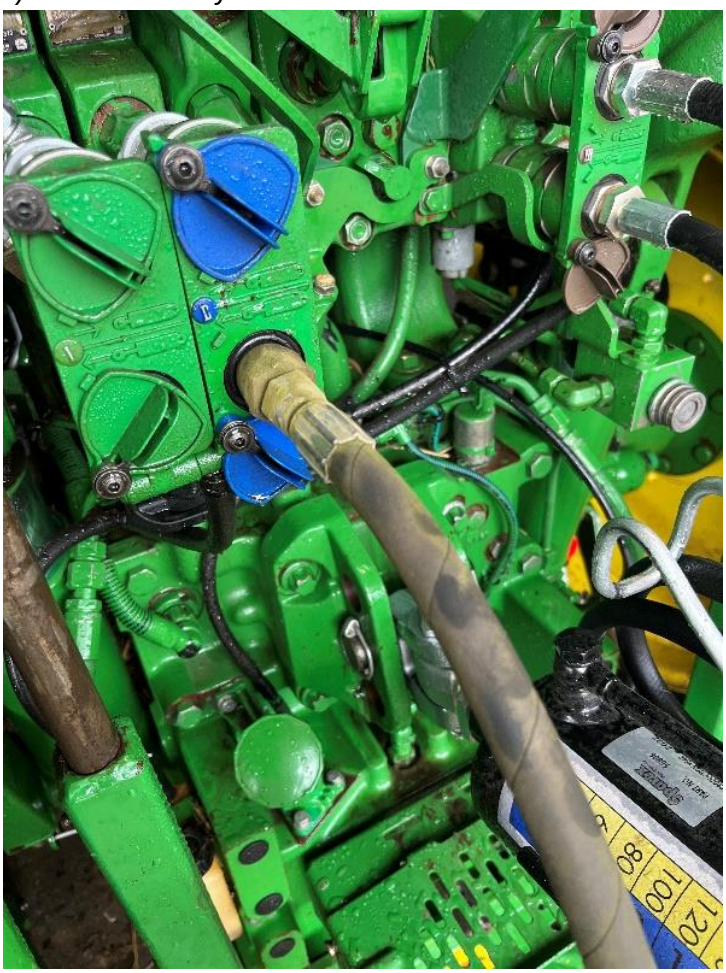


Photo 12 (assessor) Attachment: PTO

Cultivation depth

Photo 13 (assessor) Cultivation depth: hydraulic top link adjusted to the correct length

Sowing depth

Photo 14 (assessor) Sowing depth

Post-use checks

Photo 15 (assessor) Post use checks: power harrow tines and carriers

Photo 16 (assessor) Post use checks: inspecting coulters and coulter pipes

Commentary

The candidate demonstrated an excellent level of performance to efficiently carry out **field-based crop establishment** to a high-quality standard and follow the requirements of **health and safety in field-based crop establishment**. The candidate worked safely throughout the task, following their risk assessment, recognising and controlling risks such as wearing gloves and safety boots, using a face mask to reduce the risk of seed dust inhalation, and exiting the tractor in the correct direction.

The candidate applied their excellent understanding to comprehensively **prepare** the machinery **for field-based crop establishment**, considering the detailed requirements of the task which resulted in work of a high standard. For example, during the calibration process the candidate checked the bucket for cleanliness, primed the seed rollers, carefully collected the seed from 85 handle rotations, and undertook a second calibration to check their adjustments, all resulting in excellent accuracy of work.

Priming the seed rollers and using the calibration chart to give a base setting enabled the candidate to achieve the correct calibration more efficiently.

The candidate completed comprehensive pre-use and post-use checks, including checking the power harrow tines and carriers, rear roller bearings, and drill marker measurements.

The candidate's attachment of the combination drill demonstrated an excellent understanding of the machinery and strong technical skills, considering the detailed requirements of the task which resulted in work of a high standard. For example, the candidate made a physical as well as a visual check of the linkages and PTO shaft, checked the linkage spacing for compatibility, and made sure that the hydraulic connections were clean before connecting them. The candidate showed excellent skill and dexterity by safely reversing the tractor to align with the combination drill for attachment.

In the field, the candidate showed excellent skills and dexterity, efficiently operating the machinery for **field-based crop establishment**. For example, lowering the correct bout marking at the start, and checking their work at a suitable point to avoid errors for longer than needed. The candidate's bouts correctly matched and they took the turns efficiently, lifting the implement at the right time and matching up with previous bouts.

The candidate comprehensively assessed their work after 10 metres: the candidate didn't lift the implement when they stopped so that they could see it 'in work', they checked the level of the implement, the cultivation depth and the seed depth, and they checked their adjustments after a further 10 metres.

The candidate's responses to the questions showed a depth of understanding with detailed, relevant responses and consistent use of accurate technical terminology eg naming legislation, and when suggesting improvements to soil structure.

Task 2 – Business, crop, and estate planning

Task 2a) Plan production of a container-based crop

Evidence contributes to the following:

Performance outcome	Assessment themes
PO2 Establish crops in field and container-based systems for optimum yield and quality	Container-based crop establishment
PO3 Manage crops in field and container-based systems to optimise yield and quality	Container-based crop monitoring

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
report	PO2: Container-based crop establishment PO3: Container-based crop monitoring	√		√

Candidate evidence - report

Plan for the production of a crop of 5,000 Osteospermum for sale between weeks 19 and 25, propagated between weeks 5 to 10:

Starting point is a Gantt Chart showing what will be done and when, from propagation to ready for sale (explanations below):

Week	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Buy in																						
Propagate																						
Pinch																						
Pot on																						
Space out																						
Prepare for sale																						
Maintain																						

Propagate by tip cuttings: standard L128 cell trays, 7 trays on the Monday of each week.
Pinch once fully rooted (so that the plant's rooting potential is maximised), which should be 3-4 weeks after propagation.
Pot on within one week of pinching.
Space out when leaves are touching next pot.

Detailed breakdown for propagation (explanations below):

Timing	07.30-10.00	10.15-12.00	12.30-14.30	14.40-16.00
Tray filling				Done the afternoon before
Take cuttings				
Insert cuttings				
Take to prop bench				
Water and label				
Cover				

Tray filling done at the end of the day before, trays covered to stop drying out or things getting in.

Prepare propagation bench in advance, set thermostat for 20˚C, water bench, cover with clear polythene.

Cuttings taken and put into damp polythene bags, then into polystyrene box and kept cool before trimming and insertion.

Cuttings for weeks 9 & 10 taken from earlier rooted crops as the pinched tips will be ideal because they are big enough and have high rooting potential as a soft tip cutting.

Explanations

Sequence of activities starts in August of the year before, when propagators need to be contacted to put the orders in for next year, because early crops such as Osteospermum are propagated later in the previous year.

Order delivery of 7 L128 trays of rooted cuttings of 7 cultivars to arrive in weeks 4, 5 and 6. This initial stock provides 2,688 plants; pinching out provides 2,688 cuttings. That will mean more plants than are needed initially but allows for a typical failure-to-take rate of about 10%, leaving 5,077 plants available for sale. If there are excess plants, they can be sold in the farm shop.

Having deliveries on weeks 4, 5 and 6 spreads the workload and space required to ensure sufficient supply through the sale period (weeks 19-25).

Growth rate of plants increases as daylength increases so the later batches catch up, meaning that the final batch of cuttings should still be on time for the Monday. Because growth speeds up throughout spring on the established plants, the propagation day may be later in weeks 8 and 9 from pinched trays.

Cuttings taken off the stock plants early in the morning have a higher rooting potential so they will be taken early and then trimmed below a node (hormone concentration and callusing takes place here), dipped and inserted.

It should take about 10 minutes to take the cuttings from each L128 tray, and then 10 minutes to trim, dip and insert each tray. Total estimate of 20 minutes x 7 trays each week (weeks 5-10).

The pinching out process also removes apical dominance from the initial stock plants, causing them to bush out. This will produce the 3-6 branches of flowering shoots which are needed for the shop.

Resources needed

- 21 trays of rooted cuttings, which will need 31.7sq.m. of bench space in heated glasshouse. Polythene sheeting to cover trays and retain humidity, fleece to cover later crops on sunny days and to retain heat on cold nights for the early batches.
- 7x L128 cell-trays (when pot on, clean and re-use for cuttings).
- 5,100x 10.5cm pots, taupe if available.
- 50 x 50 litre bags of standard peat-free potting medium with 12-16 week balanced controlled release fertiliser (CRF) added. (Calculation based on approximate volume of 10.5cm pot, total requirement rounded up to full bags).
- Propagation medium: 75% Standard multi-purpose peat-free mixed with 25% vermiculite, 50 litres will be needed in total. Fill L128 trays the day before, water overhead with lance and rose, cover with polythene to prevent drying out before use the following morning. (Calculation based on approximate volume of L128 trays, total requirement rounded up to full bags).
- Rooting gel based on IAA/IBA for dipping cuttings, with added fungicide to minimise *Botrytis cinerea.*
- Potting machine, cutting scissors, labels, green cane dibber might be needed.
- Cleaning equipment eg brushes and waste bags for cleaning propagation bench.

Maintenance in the propagation house

Check daily for plant condition, under-bench heating working OK, any signs of pests/diseases which need treatment. Main issue likely to be *Botrytis cinerea*, remove and destroy affected cuttings as soon as seen. Use/remove fleece when needed.

Check trays after 7-10 days for signs of rooting, once roots are showing under some of the cells check daily. Begin to wean cuttings by removing polythene sheet for half an hour twice a day for a couple of days, then an hour a day for a couple of days, finally off altogether one or two days before potting on. When weaning begins, water with hose and lance, if needed, in the morning.

Potting on

Prepare standing out beds, sweep ground cover fabric clean, remove any weeds. If there have been any diseases on the previous crop spray with peroxyacetic acid disinfectant after cleaning. Set potting machine up for 10.5cm pots, fill hopper, have Danish trolleys available for taking to standing out beds. One batch of rooted cuttings would typically be potted and stood down in a morning. Water in with hose and lance to settle in the compost. Maintain growing temperature at 16-18˚C in the main plant house to promote balanced growth.

Routine maintenance

Water as required by conditions, early morning when needed. Avoid watering in the afternoon to minimise disease issues.

Liquid feed should not be required as the growing medium contains CRF to last for 12 weeks.

Daily check for pests, disorders, diseases and weeds; remove weeds and any dead/damaged plant material when seen. If pests or diseases are found alert manager immediately, isolate plants if there is any delay.

Prepare for sale

One day before needed, in the morning, prepare batches of plants according to expected demand on the day in the farm shop. Set Danish trolleys up with 6 shelves, maximum of 36 pots per shelf for transport. Water completed trolleys and leave ready to take to shop before opening. All pots to be labelled and clean.

Commentary

The candidate produced a comprehensive plan for effective **container-based crop establishment and monitoring** to a commercial scale, with detailed explanations throughout, such as the use of polythene and fleece, and avoiding watering in the afternoon. The candidate consistently used technical terminology accurately, for example *Botrytis cinerea* and CRF.

The candidate applied their excellent understanding of **container-based crop establishment** to produce a plan that covers all the relevant areas of the production process, including **container-based crop monitoring**. The candidate considered the logical plan of work to efficiently produce the crop. For example, filling the trays the afternoon

before they are required, and using the pinched tips of the earliest rooted crops for the later batches of cuttings which minimises the initial number of rooted cuttings purchased.

The candidate considered the detailed requirements of the task to ensure an excellent quality of crop, such as pinching out once roots are fully formed, checking plants have enough room to grow (spacing out in weeks 15-24), and recognising growth rate is linked to day length which impacts when cuttings are taken.

The candidate's estimations and calculations were accurate and realistic (eg weekly labour required, and allowing for a 10% failure rate) leading to a plan which would produce the required yield (5,000 plants) and quality of crop (10.5cm pots, ready weeks 19-25). The candidate correctly calculated the quantities of growing media required.

The candidate applied their understanding of sustainable **container-based crop establishment and monitoring**: they specified peat-free growing media, taupe pots which are recyclable, using polythene sheeting to minimise water loss, and using fleece to retain heat overnight rather than increase the glasshouse heating.

Task 2b) Plan the harvest of a field-based crop

Evidence contributes to the following:

Performance outcome	Assessment themes
PO4 Harvest crops for commercial markets	Business planning

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
sequenced timeline	PO4: Business planning	√		√

Candidate evidence - sequenced timeline

Timeline for oilseed rape harvest

Step 1:

Timing:	*Approximately* 28 days before 'anticipated' harvest date.
Task:	Visual inspection of the oilseed rape crop for **pod development** against industry guidance. Ensure a representative sample check of the 60ha crop is carried out. The sample to be taken from a range of locations within the cropped area to take account of the varying stages of development eg shaded areas, pest damage, areas with good aspect.
Equipment:	Industry reference materials.
Time Taken:	2 hours.

Step 2:

Timing:	*Approximately* 23 days before 'anticipated' harvest date.
Task:	Visual inspection of crop for crop maturity – comparing **seeds for ripeness** against industry guidance to assist with planning desiccation timing. Ensure a representative check of the 60ha crop is carried out (as in step 1).
Equipment:	Industry reference materials.
Time Taken:	2 hours.

Step 3:

Timing:	*Approximately* 18 days before 'anticipated' harvest date.
Task:	Visual re-inspection of crop for crop maturity – focus on assessing locations which were not as mature in step 2 – comparing **seeds for ripeness** against industry guidance to assist with planning desiccation timing. Ensure a representative check of the 60ha crop is carried out (as in step 1).
Equipment:	Industry reference materials.
Time Taken:	1-2 hours.

Step 4:

Timing:	Approximately 14-17 days before 'anticipated' harvest date.
Task:	Application of: • desiccant (glyphosate) - to help with 'evening up' the uneven ripening of the crop • a silicon pod sealant - to protect the crop from excessive losses if any adverse weather at full maturity of the crop.
Equipment:	High clearance self-propelled sprayer.
Time Taken:	5-7 hours (depends on proximity to water supply and pesticide store).

Step 5:

Timing:	At 'anticipated' harvest date (minimum 14 days following application of glyphosate and pod sealant, as per product labels).
Task:	Check **moisture content** of the seeds against industry guidance to determine exact harvest timing. Ensure a representative check of the 60ha crop is carried out (at least three samples).
Equipment:	Bucket and moisture meter, industry reference materials.
Time Taken:	2 hours.

Step 6:

Timing:	Harvest (minimum 14 days following application of glyphosate and pod sealant, as per product labels).
Task:	**Harvest crop** (direct cutting) and **transport to store**.
Equipment:	Combine harvester (fitted with side knife to prevent excessive crop shedding from side of header). 1x tractor and 2x grain trailers. (1x of the trailers to be left in field in case of delays in travelling to/from the store).
Time Taken:	30 hours (3 days) - assuming 20ha cut per day.

Commentary

The candidate produced comprehensive **business planning** for the preparation and harvesting of an oilseed rape crop. The candidate considered the detailed requirements of the task and provided excellent reasoning, including:

- checking a representative sample of the full range of stages of development across different locations within the cropped area
- recognising that they would use a desiccant due to uneven ripening
- adhering to the legal requirements of the harvest interval by specifying the minimum 14 day period before harvest
- the use of a silicon pod sealant to protect the crop from excessive losses if any adverse weather occurs at full maturity.

The specification of a high clearance sprayer shows consideration of the impact of equipment selection and how this affects in-field losses. The inclusion of a side-knife for the combine also prevents losses during harvest. Along with a spare trailer, the selection of equipment and machinery provide efficiencies during the harvest process.

The steps are logically sequenced, with appropriate timing for each step, and recognition that the time taken for step 4 may vary due to proximity of water supply and pesticide store to the field.

Task 2c) Cost the harvest of a field-based crop

Evidence contributes to the following:

Performance outcome	Assessment themes
PO4 Harvest crops for commercial markets	Business planning

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
report	PO4: Business planning	√		√

Candidate evidence - report

(Word count: 1,161)

Cost to harvest a crop
Crop: Winter Barley
Area: 60 hectares (ha)
Average yield: 8 tonnes per hectare (t/ha)
Distance from grain store: 2 miles (3.2 kilometres (k))

For the report I will look at the details for each operation, with calculations, and then summarise and totalise the costs to harvest the field-based crop.

Combine harvesting
The combine has an average output of 20 tonnes per hour (t/hr). Based on a 60ha crop yielding 8t/ha (total tonnage 480t), the combine harvesting will take 24 hours.

I have used a 'perfect conditions' scenario of 2 x 12hr days (9.30am – 9.30pm) which is achievable in a hot and dry year. During winter barley harvesting time (July) we don't tend to get the damp evenings as often happens during later season wheat harvesting.

The straw is being chopped. The John Nix Pocketbook 2023 gives a farmer's average cost of £97.30/ha for combine harvesting cereals but doesn't give a farmer's average cost for straw chopping. It does give a contractor's cost for straw chopping. I have calculated the farmer's average cost for straw chopping to be £19.97/ha. This is based on the difference between contractor's and farmer's costs. The farmers average combining cost is 87% of the contractor's cost. The contractor's cost for straw chopping is £22.96/ha x 87% = £19.97/ha for the farmer's average cost.

Assuming the combine has a grain tank capacity of 5 tonnes, it will take 15 minutes to fill the grain tank. This is calculated as follows: 20 t/hr / 60 mins = 0.333 t/min. 5t tank / 0.333 t/min = 15 mins.

Therefore, based purely on the above calculations, a grain trailer is required to offload from the combine every 15 minutes. During the offloading of the combine, a further 1 tonne of grain will be harvested and offloaded into the trailer (assuming a 3-minute offload time and 0.333 t/min). Taking all of this into consideration, the total time per offload is 18 minutes.

Grain hauling
I have calculated that two tractors and two trailers are required for grain hauling.

The business owns and operates 150hp tractors and 14 tonne grain trailers.

The block of winter barley is 2 miles (3.2 kilometres) from the store. Assuming an average speed of 30 kilometres per hour (kph) on the smooth road (accounting for fully laden and unladen speeds), the journey to and from the store will take 12mins 48s (6 mins 24s each way). This is calculated as follows:

30kph (speed) / 60 (minutes per hour) = 0.5 kpm (kilometres per minute)

3.2km (distance) / 0.5kpm (speed) = 6.4 minutes (time)
The 0.4 needs to be converted to seconds: 60 (seconds per min) x 0.4 = 24 seconds

The time spent at the store is estimated to be 12 minutes. This is based on the following:

- Weigh and sample = 5 mins
- Manoeuvring and tipping = 5 mins
- Record keeping = 2 mins

This gives a total time away from the field (travelling time and time at store) of 24 mins 48s. Rounding means we can use a figure of 25 minutes. The total time per offload is 18 minutes (see above).

In the time that one tractor and loaded trailer has travelled to the store, weighed, sampled, manoeuvred, tipped, recorded, and travelled back to the field (25 mins), the other tractor and trailer will have received its first offload (18 mins) and will be waiting for a second offload.

Unfortunately, upon returning to the field, the second tractor and trailer will be idle whilst waiting for an offload, but this is unavoidable.

The grain trailers have a capacity of 14 tonnes. This is manufacturer's rated capacity based on the trailer being full to the brim (possibly heaped) with a heavy weighing cereal crop (eg wheat with a high Kg/HL weight). Barley will have a lower specific weight than wheat, so I have allowed for trailers to hold 12 tonnes of barley. This is based on two combine tank loads (10t) and the additional 2t harvested whilst offloading on the move.

The John Nix Pocketbook 2023 gives a farmers average cost for grain hauling of £55.17/hr. Based on the combine harvesting taking a total of 24 hours, this will mean there will be 48 hours of grain hauling (2 tractors and trailers x 24hrs each). However, this can be reduced slightly (see below).

For the first load of each day, only one tractor and trailer will be required. The second tractor and trailer would not be required to be at the field until 51 minutes into the harvesting job. This is calculated as 18 mins (trailer 1, offload 1) + 18 mins (trailer 1, offload 2) + 15 mins (trailer 2, start of offload 1).

The first tractor and trailer will not need to be at the field until 15 minutes into the harvesting job, but this is offset by a tractor and trailer having to haul back to the store and tip etc. at the end of the day (after the combine harvester has stopped).

There is also a cost saving at the end of the day. During the last offload, one of the tractors and trailers will not need to return to the field. I have allowed for this in the summary of costings below by allowing a deduction of 1 hour per day for one tractor and trailer.

I considered the use of one tractor and two trailers, but for some of the offloading the combine would have to drive to the parked trailer to unload. This could increase offload time to 5 minutes (instead of 3 minutes) and no harvesting during offloading would be taking place. This would decrease the combine output and efficiency of the combine harvester. This could also compromise the plan of completing the task in 24hrs (2 x 12 hr days).

I feel that this approach will offer the most efficient harvesting of the crop as there will not be any reduction in the output of the combine harvester due to waiting for trailers. The 15 minute in-field wait between offloading load 1 and load 2 into the trailer is unavoidable, as is the waiting time when both tractors and trailers are in the field. Some of this time will be used to follow the combine in preparation for offloading.

Summary and total costs

Operation (Harvesting 480t)	**Cost/hr**	**Cost/ha**	**Cost/t**	**Total Cost:**
Combine harvesting. Total time = 24 hours (2 x 12 hr days)	£243.25	£97.30*	£12.16	**£5,838.00**
Straw chopping. Total time = 24 hours (2 x 12 hr days)	£49.93	£19.97**	£2.49	**£1,198.20**
Grain hauling (tractor and trailer 1). Total time = 24hrs	£55.17*	£22.07	£2.76	**£1,324.08**
Grain hauling (tractor and trailer 2). Total time = 22 hrs (allowing for a total of 2hrs time saved at the start/end of both harvesting days)	£55.17	£20.23	£2.52	**£1,213.74**
Totals	£403.52/hr	£159.57/ha	£19.93/t	**£9,574.02**

* Source data from The John Nix Pocketbook 2023

** Estimation based on data from The John Nix Pocketbook 2023

Commentary

The candidate produced a comprehensive report of their **business planning**, calculating the cost of harvesting the crop. The candidate justified their approach to the number of tractors and trailers which cost-effectively and efficiently harvests the crop.

The candidate considered each part of the harvest process, starting with how long the combine will need to harvest the crop and fill the grain tank, then how long the grain hauling will take. The candidate accurately calculated the relevant costs at each stage, including reference to their source data. The candidate made realistic assumptions and estimations such as the harvesting conditions and the average speed of the tractor and trailer between the field and the store.

Throughout the report the candidate considered the details that affected their calculations. For example, how much grain will be added to the grain tank whilst a tractor is offloading and recognising that the second tractor would not be needed at the start of each day. The candidate justified their approach of the tractors having short waiting periods. The candidate referenced an alternative approach and explained why the candidate discounted it by considering efficiency against cost-saving.

The candidate's table of costs clearly references the candidate's source data, and comprehensively covers all the requirements of the task.

Throughout the report the candidate accurately used technical terminology, for example hauling, offloading, fully laden, and unladen.

Task 2d) Business review

Evidence contributes to the following:

Performance outcome	Assessment themes
PO4 Harvest crops for commercial markets	Business planning

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
field-based crop gross margin for each crop	PO4: Business planning	√		√
report		√		√

Candidate evidence – field-based crop gross margin for each crop

	£/ha:	£/Total area grown:	Benchmark Data (£/ha):
Enterprise Output:			
Crop: Winter wheat Yield: 10 t/ha Selling price: 274 £/t Total area grown: 60 ha			Based on 10t/ha @ £274/t
Total Enterprise Output:	**2,740**	**164,400**	**2,740**
Variable Costs:			
Seed	77	4,620	68
Fertiliser	430	25,800	320
Spray	320	19,200	255
Total Variable Costs:	**827**	**49,620**	**643**
Gross Margin:	**1,913**	**114,780**	**2,097**

	£/ha:	£/Total area grown:	Benchmark Data (£/ha):
Enterprise Output:			
Crop: Spring barley Yield: 7 t/ha Selling price: 247 £/t Total area grown: 60 ha			Based on 7t/ha @ £247/t
Total Enterprise Output:	**1,729**	**103,740**	**1,729**
Variable Costs:			
Seed	66	3,960	69
Fertiliser	221	13,260	250
Spray	127	7,620	151
Total Variable Costs:	**414**	**24,840**	**470**
Gross Margin:	**1,315**	**78,900**	**1,259**

	£/ha:	£/Total area grown:	Benchmark Data (£/ha):
Enterprise Output:			
Crop: Winter barley (feed) Yield: 8 t/ha Selling price: 247 £/t Total area grown: 60 ha			Based on 8t/ha @ £247/t
Total Enterprise Output:	**1,976**	**118,560**	**1,976**
Variable Costs:			
Seed	74	4,440	78
Fertiliser	350	21,000	268
Spray	160	9,600	195
Total Variable Costs:	**584**	**35,040**	**541**
Gross Margin:	**1,392**	**83,520**	**1,435**

	£/ha:	£/Total area grown:	Benchmark Data (£/ha):
Enterprise Output:			
Crop: Winter oilseed rape Yield: 4.5 t/ha Selling price: 510 £/t Total area grown: 60 ha			Based on 4.5t/ha @ £510/t
Total Enterprise Output:	**2,295**	**137,700**	**2,295**
Variable Costs:			
Seed	72	4,320	64
Fertiliser	425	25,500	310
Spray	266	15,960	234
Total Variable Costs:	**763**	**45,780**	**608**
Gross Margin:	**1,532**	**91,920**	**1,687**

Commentary

The gross margins have been calculated for **business planning** using the correct method. The candidate calculated the costs for each crop using the data provided in the brief and used these to accurately calculate the gross margins.

This evidence in isolation provides minimal differentiation between grades, however it provided accurate data for the candidate's consideration of how to improve the gross margin of the enterprise in their report.

Candidate evidence – report

(Word count: 1,027)

Differences between actual gross margin and benchmark data

Winter Wheat

Seed: The actual seed costs (£77/ha) were £9 more per hectare than the benchmark data (£68/ha). This may be due to an increase in grain price which reflects in an increased cost of seed. Also, the price of agro chemicals tend to rise annually so the cost of the seed dressing (if used) may have increased.

Fertiliser: The cost of nitrogen-based fertiliser is directly influenced by wholesale gas prices because gas is a key part of the production of nitrogen-based fertilisers. Wholesale gas prices have increased considerably resulting in the increase of £110 per hectare for fertilisers (actual costs £430/ha, benchmark costs £320/ha). Growing wheat for feed is profitable based on the yield, so additional fertiliser may have been used to ensure a higher yield than there would otherwise have been.

Spray: The actual spray costs (£320/ha) were £65 per hectare more than the benchmark data (£255/ha). This may be due to higher disease pressure in the crop resulting in increased fungicide use. Higher grass weed pressure is typical within a winter wheat crop and it is usually relatively expensive to control because of the cost of the specific herbicides required. Also, the price of agro chemicals tend to rise annually so the cost of herbicides, fungicides, insecticides, and plant growth regulators (if used) may have increased.

Spring barley

Seed: The actual seed costs (£66/ha) were £3 per hectare lower than the benchmark data (£69/ha). This is close to benchmark data which could be because of efficient purchasing, for example before the rise in grain prices.

Fertiliser: The actual fertiliser costs (£221/ha) were £29 per hectare less than the benchmark data (£250/ha). This could be because a different fertiliser was used, such as organic manures which are more freely available for spreading in the spring.

Spray: The actual spray costs (£127/ha) were £24 per hectare less than the benchmark data (£151/ha). This could be because there was lower disease pressure on the crop and effective weed control pre-drilling. Spring barley tends to have a lower requirement for plant growth regulators, and sometimes these are not used at all which would have made savings.

Winter barley (feed)

Seed: The actual seed costs (£74/ha) were £4 per hectare lower than the benchmark data (£78/ha). This is close to benchmark data which could be because of efficient purchasing, for example before the rise in grain prices.

Fertiliser: For a winter cereal for the feed market the emphasis tends to be on maximising yield, so more fertilisers may be used. The cost of nitrogen-based fertiliser is directly influenced by wholesale gas prices. Gas is a key part in the production of nitrogen-based fertilisers. The wholesale gas prices have increased considerably resulting in the increase of £82 per hectare for fertilisers (actual costs £350/ha, benchmark costs £268/ha).

Spray: The actual spray costs (£160/ha) were £35 per hectare less than the benchmark data (£195/ha). This could be because there was lower disease pressure on the crop and effective weed control pre-drilling. Winter barley can outcompete weeds due to its vigorous growth habit, especially the hybrid varieties of winter barley.

Winter Oilseed Rape

Seed: The actual seed costs (£72/ha) were £8 more per hectare than the benchmark data (£64/ha). This may be due to an increased grain price, which reflects in an increased cost of seed. A higher seed price could be the result of a bio-stimulant based seed dressing. A higher sowing rate may have been used to counteract the risk of potential pest damage. 'One for the pigeon, one for the slug, and one to grow.'

Fertiliser: A winter oilseed rape crop benefits from an autumn application of fertiliser. The spring application of fertilisers is not reduced, so the overall use of fertilisers is higher. The cost of nitrogen-based fertiliser is directly influenced by wholesale gas prices. Gas is a key part in the production of nitrogen-based fertilisers. Some nutrient deficiencies, such as boron, must be managed by additional application of trace elements. All these factors could increase the cost and quantity of fertilisers applied resulting in the increase in cost of £115 per hectare for fertilisers (actual costs £425/ha, benchmark costs £310/ha).

Spray: The actual spray costs (£266/ha) were £32 per hectare higher than the benchmark data (£234/ha). This may be due to higher disease pressure in the crop resulting in increased fungicide use, or higher grass weed pressure which is typically expensive to control because of the cost of the specific herbicides. Also, the price of agro chemicals tend to rise annually so the cost of herbicides, fungicides, insecticides, and plant growth regulators (if used) may have increased.

Recommendations

There are some changes which could be considered to improve the gross margins:

- **Seed:** consider home saving seed which can be cheaper than purchasing seed.
- **Seed:** use technology for variable rate drilling which ensures efficient use of the seed across the planting area.
- **Fertilisers:** use urea-based fertilisers for the early nutrient applications instead of ammonium nitrate-based fertilisers. This is typically a more cost-effective form of nitrogen, but it needs careful consideration for timing of application.
- **Fertilisers:** increase application of fertilisers to increase yield, although there is a point where this investment in additional fertiliser is not worthwhile because there isn't much increase in yield.
- **Fertilisers:** calculate the nitrogen use efficiency (NUE) based on the predicted yield of the crop to ensure optimum use of nitrogen.
- **Spray:** adopt stale seed bed techniques to help with controlling grass weeds. This means that less herbicide sprays would be needed.
- **Spray:** use adjuvants which can optimise spray performance. This may mean that you don't need as much spray, which would save money.
- **Spray:** use bio-stimulants to promote plant health and subsequent growth which can reduce other costs.
- **General:** explore working with buying groups which can bulk purchase for a better price.
- **General:** investigate new markets such as organic produce which have a higher selling price.
- **General:** investigate new markets which use the crop differently eg milling and malting, and may have a higher selling price.
- **General:** investigate local markets/purchasers such as local farmers and feed mills, which would save on haulage fees and broker fees.

Commentary

The candidate produced a comprehensive **business planning** report considering the differences between the gross margins and making recommendations for increasing the gross margins.

The candidate analysed their accurate data for each crop to provide detailed, realistic explanations of the possible reasons for differences between the actual gross margin and the benchmark gross margin eg the influence of gas prices and seed dressing costs on purchase prices. The candidate considered all of the variable costs, although there was some repetition of the explanations where it was appropriate to the crop.

The candidate applied their excellent understanding of each crop's specific growing requirements and uses, linking these to some of the reasons for differences eg managing nutrient deficiencies in oilseed rape.

The candidate justified a wide range of recommendations that could increase the gross margin by reducing costs or increasing yield or selling prices. When making recommendations the candidate considered the variable costs which impact the gross margin: the purchase costs of the products (seed, fertiliser, spray) and the quantities of the products (seed, fertiliser, spray).

Throughout the report the candidate accurately used technical terminology, for example disease pressure and nitrogen use efficiency.

Task 2e) Plan a permanent stock-proof boundary

Evidence contributes to the following:

Performance outcome	Assessment themes
PO5 Maintain the areas surrounding the crop production environment	Business management
	Estate maintenance

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
report, with diagram	PO5: Business management PO5: Estate maintenance	√		√

Candidate evidence - report, with diagram

(Word count: 551)

Fence repair

The fence installation on a level site will consist of stock netting and two strands of barbed wire, to ensure that the fence is sheep proof. The stock netting and barbed wire will be attached on the outer side of the boundary (neighbouring property side) because the stock will push from that side.

Materials and specification

The first strand of barbed wire will be positioned close to the top of the stock netting (50mm above) to prevent the sheep pushing their heads through the gap.

The top strand of barbed wire provides additional height to the fence and will be positioned 100mm above the lower strand of barbed wire and 50mm down from the top of the post. This will prevent the top of the post from splitting when the staples are inserted.

An alternative would be to position the stock netting at a higher level and install one of the strands of barbed wire below. This would be more appropriate for smaller breeds of sheep.

Barbed staples will be used to attach the stock netting and barbed wire. These will have better retention than non-barbed staples. A full tub provides more stock than required. The excess will be stored for future tasks.

The following materials will be required for the installation (all prices excluding VAT):

Item:	Quantity:	Price Each:	Total Price:
Straining post	3	£30.81	£92.43
Strut	4	£8.00	£32.00
Intermediate post	65	£4.10	£266.50
Stock netting (100m roll)	2	£76.67	£153.34
Barbed wire (200m roll)	2	£27.43	£54.86
Staples (20kg tub)	4kg	£38.39	£7.68
		Total:	**£606.81**

The specification for the materials is provided on the plan on the next page.

Environmental considerations, legislation and codes of practice

Prior to installation a full site survey will be carried out to ensure that there are no public rights of way that will be obstructed by the fence. If a public right of way is on the site, the type of right of way will be identified (eg footpath, bridleway) and the national legislation regarding the right of way will be adhered to.

Any equipment used for fence installation will be thoroughly checked prior to use to ensure safety and suitability for the task. Any defective equipment will be reported and repaired or replaced prior to use.

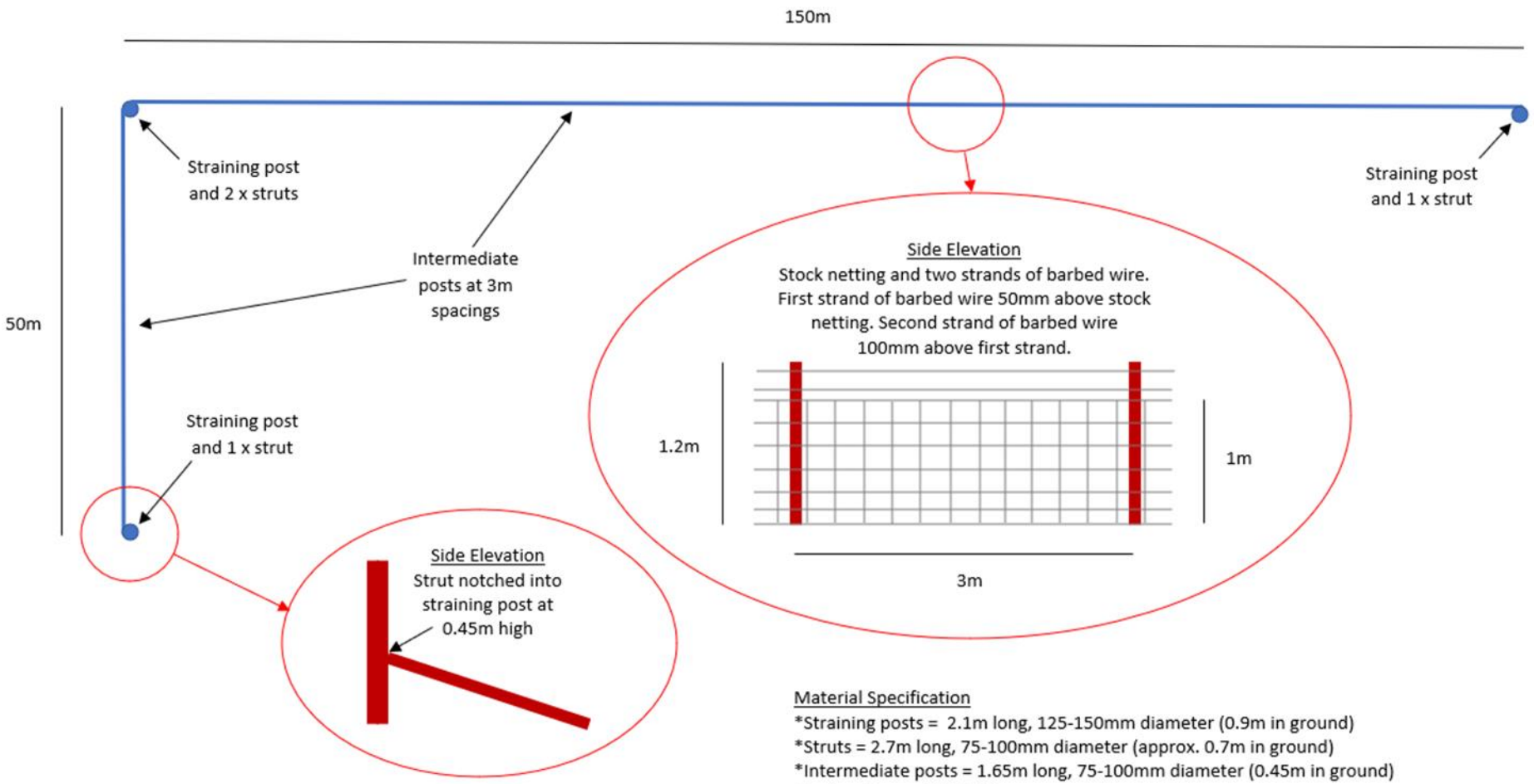
Wooden fencing posts will be purchased from sustainable sources. Suppliers will have Forest Stewardship Council (FSC) certification.

The wooden posts are pressure treated with a preservative to ensure longevity. The pressure treatment would be completed by the manufacturer.

The following items of waste will arise from the fence installation:

- metal stock netting/barbed wire offcuts and tape banding clips. These will be stored safely pending disposal and disposed of as scrap metal via a licensed commercial waste disposal contractor
- plastic tape banding used to bind bundles of posts. These will be stored safely pending disposal and disposed of via a licensed commercial waste disposal contractor
- wood offcuts from notching strainers. As the fencing posts are pressure treated with preservative chemicals the waste offcuts must be managed according to hazardous or controlled waste regulations (manufacturer to advise). They may need to be disposed of via a licensed hazardous waste disposal contractor.

In all cases of waste disposal, a copy of the waste transfer documentation must be retained as evidence of the legal transfer of waste.



Material Specification

*Straining posts = 2.1m long, 125-150mm diameter (0.9m in ground)
*Struts = 2.7m long, 75-100mm diameter (approx. 0.7m in ground)
*Intermediate posts = 1.65m long, 75-100mm diameter (0.45m in ground)
Stock netting = C8/80/15
Barbed wire = 2mm wire gauge
Staples = 40mm barbed

*Posts pressure treated with preservative

Commentary

The candidate used detailed, relevant knowledge and understanding of **estate maintenance** to create a plan for a high-quality fence replacement.

The candidate's comprehensive plan includes justifications for their approach, such as the correct spacing of wire and netting to prevent the sheep getting their head through, and positioning the staples away from the top of the post to avoid splitting.

All the requirements of the fence have been considered so the materials are appropriate to the brief, and the quantities and costs are accurately calculated or estimated (the quantity of staples), meeting the estate's **business management** requirements.

The plan is clearly communicated through the report and accompanying annotated diagram, with accurate use of technical terminology eg strands of barbed wire and strut notching. The diagram shows strong understanding of the techniques used to maintain a fence, such as the strut notching to enable tensioning of the wires.

The candidate correctly cited the need to check for rights of way, and accurately considered the environmental impact of sourcing and protecting the posts with preservative. The disposal of all types of waste has been thoroughly considered, with an appropriate approach for each type of waste, and the inclusion of storing the waste until it can be disposed of appropriately.

Task 3 – Produce container-based crops

Task 3a) Establish indoor container-based crops

Evidence contributes to the following:

Performance outcome	Assessment themes
PO2 Establish crops in field and container-based systems for optimum yield and quality	Health and safety in container-based crop establishment
	Container-based crop establishment

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
risk assessment	PO2: Health and safety in container-based crop establishment	√		√
container-based crop propagation record	PO2: Container-based crop establishment	√		√
assessor observation, including Q&A	PO2: Health and safety in container-based crop establishment PO2: Container-based crop establishment		√	√
photos			√	√

Candidate evidence – risk assessment

Candidate's name	Sample Candidate	Enrolment number	CG12345
Task/Activity	3a) Establish indoor container-based crops	Location	Centre training area
Assessor's name	Sample Assessor	Date of assessment	23/02/2023

Item no.	What are the hazards?	Who might be harmed and how?	What precautions are already in place?	Risk rating (High/ Medium/ Low)	What further action is necessary?	Action by who and when?	Residual risk rating (High/ Medium/ Low/ Trivial)
1	Cutting scissors.	Self. Cuts.	Follow training eg do not put tools in pockets (use a holder/toolbelt).	low	none		low
2	Rooting gel, plant sap, growing media.	Self. Skin irritation.	Wear disposable gloves (PPE) or barrier cream. Wash hands afterwards.	low	none		low
3	Untidy work area.	Self and others. Injury (slips, trips, falls).	Prepare site with suitable work area (benches, tools, space for bags of growing media). Tidy up as work.	low	none		low
4	Moving loads (bags of growing media, packs of trays and pots).	Self. Back injury.	Follow manual handling training eg bend knees not back. PPE (Safety boots).	medium	Use equipment to move bags around eg hydraulic pallet truck. Follow training for use of the equipment.	Self. Ongoing	low

5	Sharp edges on trays.	Self. Cuts.	Follow training on safe working.	low	Wear work gloves.	Self. Ongoing	low

Date of assessment: 23/02/2023	Risk assessment carried out by: Sample Candidate

Commentary

The candidate completed a comprehensive risk assessment which would keep themselves and others safe, showing an excellent understanding of the requirements of **health and safety in container-based crop establishment**. For example, identifying specific PPE.

The candidate applied their excellent understanding of container-based crop establishment to consider the task and identify the relevant hazards and risks. The risk assessment was completed with an excellent understanding of the difference between hazards, risks and control measures, and correctly categorised risk ratings. For example, the candidate recognised that an untidy area is the hazard rather than slips, trips and falls.

The candidate identified a range of detailed precautions to minimise the risks, making clear links between the risks and suitable control measures eg wearing PPE, specifying disposable gloves which would be thin enough for handling cuttings, following specified training.

The candidate considered further control measures that could be applied to reduce a risk rating.

Technical terminology was accurately used eg ‘manual handling’ rather than ‘lifting,’ and the hydraulic pallet truck.

Candidate evidence – container-based crop propagation record

Candidate's name	Sample Candidate	Enrolment number	CG1234
Task/Activity	3a) Establish indoor container-based crops	Location	Centre training area
Assessor's name	Sample Assessor	Date of assessment	23/02/2023

Date:	23/03/23
Plant name:	Osteospermum 'Stardust'
Source material:	Bought-in rooted cuttings from Guilds Supplies, originally in P108s but potted on immediately to get the plants growing, more propagules available that way.
Quantity:	30
Glasshouse/tunnel number:	Main glasshouse
Bench:	Bench 2
Required propagation conditions:	20˚C, polythene sheet cover, fleeced to reduce heat from sunlight and maintain warmth at night (reduces power required to keep the bench at the optimum temperature).

Date:	23/03/23
Plant name:	Plain cress
Source material:	Seeds from Guilds supplies
Quantity:	6 cress punnets (1 packet of seed)
Glasshouse/tunnel number:	Main glasshouse
Bench:	Bench 3
Required propagation conditions:	12°C and above for germination. Keep constantly moist.

Commentary

The candidate completed a comprehensive record of **container-based crop establishment**, showing an excellent understanding of how to present detailed, relevant information such as the appropriate germination and propagation conditions.

All sections have been completed with detailed comments where appropriate, for example the source plants for the cuttings. The candidate used the botanically correct name for the source plants.

Assessor evidence – assessor observation, Q&A, and photos

Task	Assessment component number
3a) Establish indoor container-based crops	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO2: Health and safety in container-based crop establishment PO2: Container-based crop establishment

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	**Notes –** *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• Selection and preparation of resources.	Followed correct manual handling when moving bags of growing media and packs of trays and pots. Wore appropriate PPE (gloves, safety boots). **Osteospermum:** Cutting trays selected, checked for condition. Mixed propagating medium: 75% Standard multi-purpose peat-free mixed with 25% vermiculite. Selected cutting scissors, wiped clean with disinfectant first, rooting gel and dibber. **Plain cress:** Punnets selected; condition checked. Germination medium selected: peat-free multi-purpose.
• Safe, accurate and efficient work, using appropriate tools and equipment, avoiding wastage and working at appropriate speed.	Efficient, working at industry speed. No wastage: • accurate broadcast sowing after taking time on the first punnet • clean cuts at correct angle made when taking cuttings.

• Preparation of site, fill and make ready six standard cress punnets/trays and broadcast sow with fine (small) seeds (rate specified with the seeds). • Collection and preparation of 30 soft stem cuttings; prepare one or more suitable containers for insertion of cuttings; undertake trimming and other applicable treatment and insert cuttings.	Site prepared with all resources and equipment close to hand. Cleaned work bench (brushed down). A tidy work area was maintained eg bags of growing media not creating a trip hazard, and within reach with limited turning and lifting required. All work completed in compliance with risk assessment and health and safety best practice eg wearing gloves, safe lifting of bags of compost and trays of pots. **Osteospermum:** 2 cuttings trays prepared with growing medium; trays filled and firmed evenly. Pre-watered. Candidate given 10 plants to select and take cuttings from. Cuttings removed from stock material by cutting above nodes, cuts made carefully and cleanly with cutting scissors. Selected terminal shoots at appropriate length with no damage. Cuttings made on bench stored in dampened bag until 30 were completed; assessor took photo in tray (photo 1). 30 cuttings trimmed below nodes, all at the ideal length, leaving 2 or 3 developed leaves in place. Flower buds removed where present (photo 1). Used dibber to make hole. Cuttings dipped in gel, inserted one per cell to correct depth. Left edge row blank in second tray of cuttings (photos 2 & 3). Used fingers to gently secure the cutting in place. No damage to the stems. **Plain cress:** Cleaned area, filled 6 punnets evenly with growing medium, consolidated effectively with depth consistent and appropriate. Watered first carefully with watering can and fine rose, minimal time needed for the punnet to dry. Quick to work out the arithmetical calculation of 1.5g seed per punnet, then weighed out seeds for each punnet within appropriate range of 1.49g to 1.52g per punnet. (4,500 seeds in the packet, assessor provided sowing rate of 500 seeds per tray). Even broadcast sowing with no wastage (photo 4).
• Place completed propagation into appropriate environment and carry out immediate post-propagation maintenance.	**Osteospermum:** Watered and labelled immediately (plant name, date, source). Taken to propagation bench, covered with polythene and fleece. **Plain cress:** Labelled the batch of 6 punnets with name and date. Took to propagation area, placed on bench. Questions asked – see below.

• Disposes of waste appropriately.	Unused gel rinsed from container into compostable waste bin with trimmed plant material and small amount of contaminated compost. Left work area tidy.
• Complete relevant records and labelling as applicable e.g. what sown, growing medium, date, source plant (for cuttings).	Yes, see container-based crop propagation record. Punnets and pots labelled.

Responses to questions	**Notes –** *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• What regulations apply to propagation and sale?	Candidate replied that plants must be named correctly (Genus and cultivar) and have a UK plant passport identifier. Plant breeder rights limit what propagation can take place and in what context.
• Explain the advantages of a glasshouse compared to a polytunnel for vegetative propagation.	Candidate stated that glasshouse had better heat retention because the light wavelength is changed by glass meaning that heat is retained, and this doesn't happen in polytunnels. The natural light is also usually better under glass as it's easier to keep clean.
• Compare mist units with polythene covers for the rooting environment for vegetative propagation.	Candidate stated that mist units were better because the humidity was maintained automatically by the technology, and cuttings were visible; poly-covers were simple, but cuttings couldn't be checked without lifting the covers. Reliability can be a problem with mist units, whereas polythene cover is guaranteed to be functional and easily repaired or replaced if damaged.

Assessor signature	**Date**
Sample Assessor	23/02/2023

Photo/video evidence

- Photos:
  - all the trays **after** sowing: showing evenness of sowing, levels of finished growing medium
  - propagules:

- **after** preparation: trimming of leaves, position of basal cut, size of cutting, one photo of all of the propagules
- **after** insertion: appropriate spacing in the container, and depth of insertion.

Photo 1 (assessor) After preparation: trimming of leaves, position of basal cut, size of cutting, one photo of all of the propagules

Photo 2 (assessor) After insertion: spacing in the container

Photo 3 (assessor) After insertion: depth of insertion

Photo 4 (assessor) All the trays after sowing: evenness of sowing, levels of finished growing medium

Commentary

The candidate demonstrated an excellent level of performance to efficiently carry out **container-based crop establishment** to a high-quality standard and meet the requirements for **health and safety in container-based crop establishment**. For example, the candidate quickly worked out the weight of seeds for each punnet, and made careful cuts for propagation so that there was not any wastage. The candidate followed their risk assessment, recognising and controlling risks such as safe manual handling when moving bags of compost and packs of trays and pots.

The candidate applied their excellent understanding of **container-based crop establishment** to prepare the correct resources (eg optimum growing media, all resources to hand) and a clean, tidy work area (eg cleaned cutting scissors).

The candidate accurately calculated the weight of seeds for each punnet based on the sowing rate provided, and then took care to broadcast sow without waste, working at industry speed.

The candidate took the cuttings with care, selecting strong source material and making clean cuts at the correct place. The cuttings were prepared and inserted into the trays correctly, missing the edge rows where possible because these are susceptible to drying out, followed by the correct post-propagation maintenance, including watering and covering with polythene and fleece.

The candidate's application of understanding and careful approach would result in excellent standards of crop yield and quality.

The candidate's responses to the questions showed depth of understanding with detailed, relevant responses and consistent use of accurate technical terminology eg plant naming conventions and reference to plant breeders' rights.

Task 3b) Manage container-based crop performance

Evidence contributes to the following:

Performance outcome	Assessment themes
PO3 Manage crops in field and container-based systems to optimise yield and quality	Container-based crop monitoring
	Container-based crop management

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
container-based crop diary	PO3: Container-based crop monitoring PO3: Container-based crop management	√		√
assessor observation, including Q&A			√	√
photos		√	√	√

Candidate evidence - container-based crop diary

Candidate's name	Sample Candidate	Enrolment number	CG12345
Task/Activity	3b) Manage container-based crop performance	Location	Centre training area
Assessor's name	Sample Assessor	Date of assessment	March - April 2023

Crop: Osteospermum **Glasshouse/tunnel number:** 1 **Bench:** 1

Date of crop visit:	Observations:	Recommendation for actions: (with justification)	Actions taken: (with justification)
Week 10 Monday (1hr)	No visible roots. Photo 1 – L128 tray **Monitoring for pests, diseases and disorders (P, D & D):** Check for *Botrytis cinerea*, aphids. Nothing evident.	**Crop cover:** Lift and check for issues, put back cover (staff do on days when I am not available).	**Irrigation:** Water using hose and lance with fine rose fitted and minimal pressure, just to dampen leaves, as not yet rooted; keeps plants cool and prevents drying out. **Crop cover:** Lift and check for issues, put back to maintain humidity.
Week 10 Thursday (1hr)			**Irrigation:** Water using hose and lance with fine rose fitted and minimal pressure, just to dampen leaves, as not yet rooted; keeps plants cool and prevents drying out. **Crop cover:** Lift and check for issues, put back to maintain humidity.
Week 11 Monday (1hr)	No visible roots. **Monitoring for P, D &** D: Check for *Botrytis cinerea*, aphids. Nothing evident.	**Crop cover:** Lift and check for issues, put back (staff do on days when I am not available).	**Irrigation:** Water using hose and lance with fine rose fitted and minimal pressure, just to dampen leaves, as not yet rooted; keeps plants cool and prevents drying out.

			Crop cover: Lift and check for issues, put back to maintain humidity.
Week 11 Thursday (1hr)	**Rooting:** Visual check by taking out one very carefully from each tray. Callusing is underway (on schedule).	**Rooting:** Rooting should be evident next week. Tell staff so they are aware.	**Irrigation:** Water using hose and lance with fine rose fitted and minimal pressure, just to dampen leaves, as not yet rooted; keeps plants cool and prevents drying out. **Crop cover:** Lift and check for issues, put back to maintain humidity.
Week 12 Monday (1hr)	**Rooting:** Rooting now evident. **Monitoring for P, D & D:** Check for *Botrytis cinerea*, aphids. A couple of lower leaves show early signs of *Botrytis cinerea* – blackening, damp – no signs of asexual spores yet so caught in time.	**Irrigation:** On Thursday carry out first 'actual' watering because roots now present and can take in water. **Crop cover:** Remove cover for one hour each morning and late afternoon (staff do on days when I am not available).	**Irrigation:** Water using hose and lance with fine rose fitted and minimal pressure, just to dampen leaves, as not yet rooted; keeps plants cool and prevents drying out. **P, D & D:** Removed leaves with early signs of *Botrytis cinerea*, waste taken straight away to green-waste bin outside to avoid dispersal of *Botrytis cinerea* spores. **Crop cover:** Remove cover for one hour each morning and late afternoon to wean the plants to normal growing conditions.
Week 12 Thursday (1hr)	**Rooting:** Some roots showing beneath cells in both trays (on schedule).	**Rooting:** Alert tutor as should be ready for potting next week (wk. 13) and space will be needed at the potting area, with all resources too. Resources were bought in at the start, so no problems expected but best to be sure.	**Irrigation:** Carried out first 'actual' watering with hose and lance, fine rose at normal pressure; repeat passes checking edges in particular which are more susceptible to drying out. Before reeling in hose checked water had fully penetrated. Hung lance up on hook as they are expensive and easily damaged. **Crop cover:** Remove cover for one hour each morning and late afternoon to wean the plants to normal growing conditions.

Week 13 Monday (1hr)	Growth is a healthy dark green, so no nutrient shortage. **Rooting** now evident due to extension growth**.** Checked under trays and 8 out of 10 cells in each pack have roots showing (on schedule). **Monitoring for P, D & D:** Check for *Botrytis cinerea*, aphids, thrips, anything else that doesn't look good. Nothing found.	**Irrigation:** Daily, early morning (staff do on days when I am not available). **Crop cover:** Covers gone; plants kept back still have covers. **Pot on**: Take is 87% which are ready for potting-on on Thursday. 5% look in good condition, but not ready for potting yet so put back for potting later. Ensure bench is clean to avoid contamination of growing medium. Work in batches of 4 which can be carried together easily. Ensure roots have good contact with growing medium (will not grow into large pore space).	**Irrigation:** Early morning to provide water the plant will need throughout the day, and there is less risk of scorch than later in the day. With hose and lance, fine rose at normal pressure; repeat passes checking edges in particular. **Crop cover:** Covers gone except for those plants put back (not potting on yet).
Week 13 Thursday (1hr)		**Irrigation:** Daily, early morning (staff do on days when I am not available).	**Irrigation:** Early morning. With hose and lance, fine rose at normal pressure; repeat passes checking edges in particular. **Pot on:** Majority of plants (as identified on Monday). Watered in (photo 2). Put in growing area (photo 3). **Crop cover:** Covers gone except for those put back. **Pinched out** all those potted on (to remove apical dominance and encourage bushy growth).
Week 16 Monday (2hrs)	Rest of crop have been potted on by staff during break.	**Irrigation:** Daily, early morning (staff do on days when I am not available). **Crop cover:** Rest of cover removed.	**Irrigation:** hose & lance. **Weeds:** removed and disposed of in green-waste bin.

	Plant growth is bushy due to pinching out (photos 4 & 5). No buds. **Monitoring for P, D & D:** Check for *Botrytis cinerea*, aphids, thrips, anything else that doesn't look good. Nothing found. **Checking for weeds:** Routine with P&D check, one broad leaf weed found (photo 6).		Rest of cuttings disposed of in green-waste compost pile because these will have been too late for main sales period. **Pinching out:** Pinch out the late ones (to encourage bushy growth).
Week 17 Monday (2hrs)	Flower bud seen on two plants. **Monitoring for P, D & D:** Check for *Botrytis cinerea*, aphids, thrips, anything else that doesn't look good. Nothing found. **Checking for weeds:** Routine with P&D check. None found.	**Irrigation:** Daily, early morning (staff do on days when I am not available).	**Irrigation:** hose & lance.
Week 18 Monday (2hrs)	More buds appearing (on schedule). **Feeding:** observe buds so need feed to push on flower bud production to stay on schedule (quality & yield required: 3 visible buds with at least one showing colour). **Monitoring for P, D & D:** Routine check before watering. Nothing found.	**Irrigation:** Daily, early morning (staff do on days when I am not available). **Feeding:** Liquid feed at 1:300 setting, high K, every watering. Little and often is better than other approaches. **Monitoring for P, D & D:** Use disinfected snips to removed lower leaves that are at soil level as these are likely to die off and could then cause problems. Dispose of in green-waste compost bin.	**Irrigation:** hose & lance. **Feeding:** applied as recommended.

	Checking for weeds: Routine with P&D check. None found.		
Week 19 Monday (2hrs)	Many buds with colour showing (on schedule). **Feeding:** as week 18. **Monitoring for P, D & D:** Routine check before watering. Nothing found. **Checking for weeds:** Routine with P&D check. None found.	**Irrigation:** Daily, early morning (staff do on days when I am not available). **Feeding:** Liquid feed at 1:300 setting, high K, every watering. Little and often is better than other approaches. **Prepare for sale:** consider preparing some for sale next week.	**Irrigation:** hose & lance. **Feeding:** applied as recommended.

Supporting photos

- supporting photo evidence of the monitoring and maintenance, for review by the assessor. The photos should be of pests, diseases, growth of cuttings at regular intervals, crop condition etc. and can be submitted digitally.

Photo 1 (candidate) L128 tray of Osteospermum crop (week 10)

Photo 2 (candidate) Potted on Osteospermum (week 13)

Photo 3 (candidate) Potted on Osteospermum (week 13)

Photo 4 (candidate) Bushy plant growth (week 16)

Photo 5 (candidate) Bushy plant growth (week 16)

Photo 6 (candidate) Broad leaf weed (week 16)

Commentary

The candidate applied their excellent understanding of **container-based crop monitoring and management** to produce a comprehensive, clearly presented report, with the use of accurate technical terminology throughout eg humidity, *Botrytis cinerea*, asexual spores, apical dominance.

The candidate provided a detailed record of their crop visits, with relevant observations on each visit, such as monitoring crop development and for signs of pests, disease, disorders, and weeds. The candidate applied excellent understanding to remove the lower leaves (week 18) to reduce the risk of issues.

The observations accurately reflect the relevant, actual conditions recorded by the assessor in the assessor observation form, such as timing for potting on. The report includes the candidate's photos which confirm their observations.

The candidate used comprehensive analysis of their observations to inform their well-justified recommendations and actions. For example, once root development had started, the candidate changed the approach to irrigation, and they correctly identified and disposed of the leaves with *Botrytis cinerea.*

Assessor evidence – assessor observation, Q&A, and photo

Task	Assessment component number
3b) Manage container-based crop performance	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO3: Container-based crop monitoring PO3: Container-based crop management

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• Safe, accurate and efficient work, using appropriate tools and equipment, avoiding wastage and working at appropriate speed.	*The candidate's findings **must** reflect the actual status of the crop when they visit, so the assessor must observe and record the status of the crop on each visit.* The candidate's diary correctly reflected the actual conditions of the Osteospermum crop on each visit: Week 10 – no PDD or weeds, no roots visible Week 11 – no PDD or weeds, callousing of roots Week 12 – some *Botrytis cinerea* leaves (no spores), no other PDD or weeds, rooting visible beneath trays Week 13 – no PDD or weeds, extension growth, majority ready for potting on, rest not ready for potting on, potted on plants ready for pinching out Week 16 – no PDD, some weeds, potted on plants ready for pinching out Week 17 – no PDD or weeds, small quantity of flower buds Week 18 – no PDD or weeds, more flower buds (ready for liquid feed) Week 19 - no PDD or weeds, multiple flower buds with colour (ready for liquid feed).
• Irrigation.	**Observed week 12: Thursday** Candidate collected the hose, attached to the irrigation source, attached lance. Watered the crop of Osteospermum efficiently, passing back to front and then revisiting edges. Let drain, then passed over again twice. Left for short period before picking up a pot to check weight and for drips. Efficient, working at industry speed.

	No wastage or damage. Questions asked about weeds and irrigation.
• Liquid feed.	**Observed week 18: Monday** Wearing non-slip footwear. Gathered equipment: connected up diluter, hose and lance. Used high K liquid feed. Candidate set the gauge on the diluter to 1:300, it was showing colour and so was ready for use. Applied to all plants in the crop. Efficient, working at industry speed. No wastage or damage. Question asked about feeding.
• Transplanting/potting up.	**Observed week 13: Thursday** Candidate put on PPE first (disposable gloves and dust-mask). Prepared potting bench by brushing clean. Collected resources: • a bag of peat-free potting medium • box of 10.5cm pots • disposable gloves. Put on disposable gloves. Organised site and filled pots in batches of 4; rubbed down lumps and levelled. Used a pusher to remove rooted cells, checked condition, pushed into pots centrally and firmed in well. Added colour label (photo 1). Put completed pots into carry trays and loaded these onto flat barrow. Took to growing bed in house 3 where a clean weed-suppressant-covered area was available for setting down. Put down pot-thick in trays. Returned to potting bench, brushed clean (could have cleaned corners better). Put contaminated compost in green-waste bin. Efficient, working at industry speed – could improve with more practice. No wastage or damage. Question asked about transplanting.
• Disposes of waste appropriately.	Weeds & diseased materials: added to green-waste bin when required. Potting on and removed lower leaves (week 18); waste put into green-waste compost bin for recycling.

Responses to questions	**Notes –** *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Weeds, pests, diseases, and disorders within the cropping environment: • why did you recommend particular control measures? • why is accurate timing of control measures important?	Weeds need to be removed manually so that the crop is not disturbed. A herbicide for a broad-leaf weed could not be used because the crop is broad-leafed as well. There was only one weed which was removed before flowers were visible. Early intervention reduces the chance of the problem spreading. For example, this weed was removed before the flowers developed.
• Irrigation – what factors did you consider to irrigate the crop when you did?	I used a fine rose and low pressure initially just to dampen the leaves; plants at this stage are very delicate and so could be easily damaged. I didn't want the cuttings drying out because they didn't have much root. Once roots have developed, I will change to a fine rose at normal pressure in the early morning so that there is less risk of scorching. I will make sure the water has fully penetrated, paying particular attention to the edges which can dry out more easily.
• Feeding – why did you feed the crop when you did?	The buds had started to appear and so I needed to manipulate the growth, pushing on the flower bud production, so that the plants would be ready for sale at the right time. I used a ratio of 1:300 because it is applied at every watering.
• Transplanting – how did you decide when to transplant the crop?	When the rooting was evident due to extension growth. The majority of the plants were ready at the same time, but I kept back the plants which were not ready.

Assessor signature	**Date**
Sample Assessor	As noted above.

Photo/video evidence

- Photo:
  - completed potting up/transplanting.

Photo 1 (assessor) Completed potting up/transplanting

Commentary

The candidate demonstrated an excellent level of performance to safely and efficiently carry out **container-based crop monitoring and management** to a high-quality standard. For example, during irrigation the candidate passed the lance from back to front and paused to allow for drainage before checking that the pots were dripping (that irrigation had met the plants' needs). When transplanting, the candidate handled the plants carefully, using a pusher to remove the rooted cells. The candidate could have cleaned the bench more thoroughly after potting.

The candidate applied their excellent understanding of **container-based crop management** to prepare the correct resources (eg PPE, optimum growing media, all resources to hand) and manage a clean, tidy work area. The candidate worked at industry speed with no wastage or damage, although the candidate could work more quickly.

The candidate's application of understanding and careful approach would result in excellent potential standards of crop yield and quality.

The candidate's responses to the questions showed depth of understanding with detailed, relevant responses and consistent use of accurate technical terminology eg herbicides, scorching, manipulation of growth.

Task 3c) Collect and prepare a container-based crop for sale

Evidence contributes to the following:

Performance outcome	Assessment themes
PO4 Harvest crops for commercial markets	Harvesting container-based crop

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
container-based crop collection order sheet	PO4: Harvesting container-based crop	√		√
assessor observation			√	√
photos			√	√

Candidate evidence - container-based crop collection order sheet

Candidate's name	Sample Candidate	Enrolment number	CG1234
Task/Activity	3c) Collect and prepare a container-based crop for sale	Location	Centre training area
Assessor's name	Sample Assessor	Date of assessment	23/03/2023

Customer:	Farm Shop
Crop:	Osteospermum in 10.5cm pots
Quantity ordered:	10x
Specification:	Grade 1 (sufficiently moist, no weeds, dead leaves, P&D present) Number of branches/shoots per plant: 3+ Number of open flowers: 1+ Labelling: Name and card, front facing
Crop collected to specification: (tick)	✓

Commentary

The order sheet for **harvesting the container-based crop** has been completed in detail, including the Grade 1 specification provided by the assessor.

This evidence in isolation provides minimal differentiation between grades, however it supports the observation of detailed, careful work with an accurate, detailed record.

Assessor evidence – assessor observation and photos

Task	Assessment component number
3c) Collect and prepare a container-based crop for sale	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO4: Harvesting container-based crop

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• Select and prepare appropriate resources for the task.	10 plants chosen from the growing bed, colour labels from store. Danish trolley, 6-cell carry trays, cutting scissors and waste bucket collected. Checked hose and lance were available and connected.
Grading, preparation, pre-treatment, and packing ready for despatch or sale: • The candidate must carry out relevant preparation prior to packing into appropriate carry trays or onto Danish trolley shelves e.g. remove dead leaves, weeding, watering, final feed, deadheading, pest and disease removal/rejection of crop.	Appropriate selection of plants made; all of a standard at the Grade 1 specification given (photo 1). All plants checked for watering requirement by checking under pots. None were watered (assessor note: none in need of watering, damp circles visible on weed suppressant fabric). Dead leaves removed. Checked for P&D (none present). No wastage. Cleaned pots. Labels replaced correctly (photo 2). Packed securely. All plants met Grade 1 specification given – balanced appearance, bushy, colour showing. Order sheet completed. Industry standard speed of work. Worked safely throughout.

• Disposes of waste appropriately.	Dead leaves removed, placed into bucket, bucket emptied into green-waste compost bin.

Assessor signature	**Date**
Sample Assessor	23/03/2023

Photo/video evidence

- Photos:
  - one plant **before** the candidate starts the task to show example of plant condition
  - one plant once **ready for sale** showing detail of preparation e.g. dead leaves removed, deadheaded and other treatments as required.

Photo 1 (assessor) One plant before the candidate starts the task to show example of plant condition

Photo 2 (assessor) One plant once ready for sale showing detail of preparation

Commentary

The candidate demonstrated an excellent level of performance to safely and efficiently carry out **harvesting of the container-based crop** to a high-quality standard. The candidate worked at industry standard pace to complete the task with all the plants meeting the Grade 1 specification and no wastage.

The candidate applied their excellent understanding of **harvesting the container-based crop** to select a suitable standard of plants from the growing bed and produce well-presented plants eg well-balanced plants, clean pots and clear labelling.

Task 4 – Produce field-based crops

Task 4a) Manage field-based crop performance

Evidence contributes to the following:

Performance outcome	Assessment themes
PO3 Manage crops in field and container-based systems to optimise yield and quality	Field-based crop monitoring
	Field-based crop management

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
report	PO3: Field-based crop monitoring PO3: Field-based crop management	√		√
photos	PO3: Field-based crop monitoring	√		√
assessor observation			√	√

Candidate evidence – report and photos

(Word count: 1,478)

Winter wheat crop
Soil type: medium loam

Visit 1
Date: 01/02/2023
Growth stage: 23 (main shoot, 3 tillers).
Soil conditions: moist following over winter rainfall and a recent light rainfall.

Photo 1a (candidate) Even emergence: crop at growth stage 23 (main shoot, 3 tillers), leaves are even green colour with no yellowing

Photo 1b (candidate) Soil conditions: moist ground conditions after recent rainfall

An overall walk of the crop (in a W pattern across the field) showed that there was even emergence across the field.

The headland area by the field entrance was a little compacted due to traffic, so there were less emerged plants in this area.

A 0.25m^2 quadrat was thrown in a random area of the crop to give the following observations:

- plants looked healthy (even green colour, no yellowing symptoms indicating stress or nutrient deficiency)
- 60 plants counted: 60 x 4 = 240 plants per m^2
- based on a sowing density of 325 plants per m^2 in autumn, therefore establishment of (240/325) x 100 = 74%
- winter losses of around 26%; expected germination failures and realistic winter losses, typically damaged by slugs, birds and frost
- a few plants were dug up to check root establishment. Roots looked healthy and were not stunted due to compaction
- no weeds visible in the quadrat. Approximately 5 small broad-leaved weeds visible within the area surrounding the quadrat – groundsel, mayweed and cleavers. No grass weeds present.
- small amount of *Septoria Tritici* was present on a few of lower leaves.

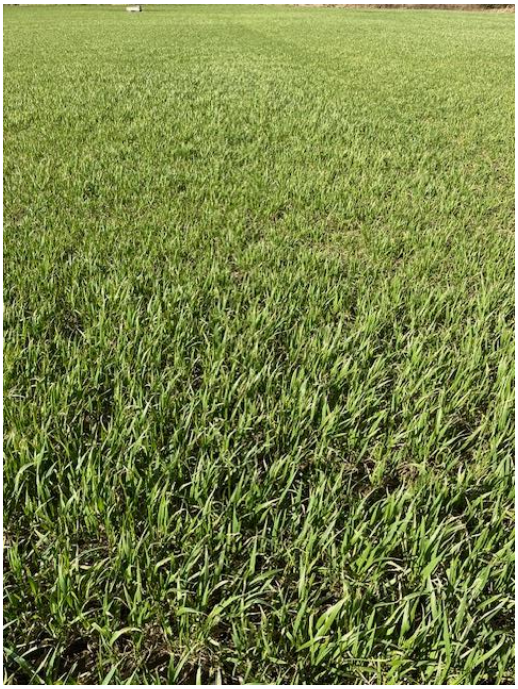
Photo 2 (candidate) Root establishment: no signs of stunted growth, appropriate growth for stage 23

Photo 3 (candidate) Septoria on lower leaves

The crop development and conditions were as expected for the time of year.

Visit 2
Date: 01/03/2023
Growth stage: 23 (main shoot and 3 tillers)
Soil conditions: moisture present at minimal depth, dry surface

Photo 4 (candidate) Increased biomass: growth stage 23 (main shoot and 3 tillers)



A W pattern walk of the crop showed continued even emergence across the field. The crop appeared to have increased in biomass area since visit 1.

The headland area by the field entrance was still showing poor emergence due to compaction.

A random 0.25m^2 quadrat gave the following observations:

- plants looked healthy (even green colour, no yellowing symptoms). Crop received its first dose of nitrogen fertiliser 7 days ago
- 59 plants counted: 59 x 4 = 236 plants per m^2 which is similar to visit 1
- some plants were dug up to check root establishment. Roots looked healthy and were not stunted
- no weeds in the quadrat. Observed approximately 12 groundsel, mayweed and cleavers that were present; they had grown since the previous visit but they were not competing with the crop. Approximately 9 small brome plants were identified close to the edge of the crop
- small amount of *Septoria Tritici* was still present on a few of the lower leaves but didn't appear to have spread since visit 1.

The crop development and conditions were as expected for the time of year.

Visit 3

Date: 22/03/2023

Growth stage: Mainly 23 (main shoot and 3 tillers), with a few main shoots approaching GS30 (ear at 1cm)

Soil conditions: moist

Photo 5a (candidate) Plants starting to extend towards GS30: mainly growth stage 23 (main shoot and 3 tillers) with a few main shoots approaching growth stage 30 (ear at 1cm).

Photo 5a (candidate) Moist ground conditions

Photo 6 (candidate) Yellowing of older leaves

A W pattern walk of the crop showed the crop looking much thicker. The crop looked a little pale (yellow) in a few areas; likely due to significant rainfall and a requirement for a second dose of nitrogen.

The headland area by the field entrance still showed poor emergence due to compaction. This poor emergence is unlikely to improve.

A 0.25m^2 quadrat in a random area gave the following observations:

- plants a little pale (slight yellowing symptoms). Yellowing is evident on older leaves indicating nitrogen deficiency
- 61 plants counted: 61 x 4 = 244 plants per m^2 which is similar to visits 1 and 2
- some plants dug up to check root establishment. Roots looked healthy and increased in size since the last visit. No evidence of compacted soil
- 2 brome weeds in the quadrat. Groundsel, mayweed and cleavers were increasing in size, particularly the groundsel. The number of brome plants on the headland have increased to 15 and are competing with the crop, and the nearby plants are stunted. These will all need controlling as soon as conditions allow. Herbicide to be applied. Wild oats were identified by an electricity pylon; a wider check showed these to be confined to this area of about 1m^2
- lower leaves showing *Septoria Tritici* have died back. New growth is not showing any symptoms of disease. A fungicide could be applied to provide protection until the T1 (leaf 3 emerged) fungicide timing.

Photo 7a (candidate) Weeds: Brome

Photo 7b (candidate) Weeds: Cleavers

Photo 7c (candidate) Weeds: Groundsel

Photo 7d (candidate) Weeds: Mayweed

The crop development and conditions were as expected for the time of year.

Integrated Pest Management (IPM)

Hand rogueing the wild oats during late spring will be effective because they are in a small area, avoiding the need for chemical control.

Patch treatment: brome was identified on a headland that borders a grass margin. That headland can be treated with herbicide that targets brome prior to stem extension; not required for the remainder of the field.

Fertiliser Plan

Current crop: Winter wheat for feed
Previous crop: Winter oilseed rape
Expected yield: 8 t/ha
Target P&K indices: P=2, K=2-

This plan uses manufactured fertilisers: nitrogen (N), sulphur (S), phosphate (P), potash (K). The type of previous crop enables accurate use of industry guidance to calculate nitrogen requirements for the current crop. Based on the previous crop of winter oilseed rape and expected 8t/ha yield of the winter wheat, the estimated total nitrogen (N) requirement is 190kg/ha, which is the standard for this crop and conditions.

Nitrogen can be applied to the crop as follows; split into three applications to ensure maximum efficient use (when the crop needs nitrogen) and reduce the risk of leaching:

- 1 - prior to stem extension (mid-February to mid-March) – 30% of total application
- 2 - early stem extension (early April) to replace used nitrogen – 35% of total application
- 3 - end of April – 35% of total application.

S needs to be applied to the crop, usually in conjunction with nitrogen fertilisers during early spring (application 2). Sulphur also helps with utilisation of nitrogen.

P index of 2: phosphate will replace crop offtake and maintain a target index of 2. As this is a maintenance amount it can be applied at any time during the year to give the benefit to the following crop.

K index of 2-: potash will replace crop offtake and maintain a target index of 2-. As this is a maintenance amount it can be applied at any time during the year to give the benefit to the following crop.

Legislation and industry best practice

The farm is not located within a *Nitrate Vulnerable Zone (NVZ)* so restrictions on timings of application do not apply, however, the *Farming Rules for Water* will apply. The rules require good farming practice so that farmers manage their land to avoid water pollution. The rules also state that fertilisers are spread to meet crop and soil needs.

Buffer zones must be adhered to when spreading fertilisers in order to protect watercourses, hedges and field margins/non-cropped areas. The application of fertiliser must only be to the intended target. Accurate application can be achieved in many ways, such as use of the following:

- full-width solid fertiliser spreaders
- liquid fertiliser, applied full width through a sprayer
- spinning disc applicators.

Where used, the correct headland settings should be set to ensure the applied fertiliser stays within the boundary of the crop.

Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers: Fertiliser must be spread in suitable weather conditions. When using urea-based fertilisers (non-protected urea) they should be applied in moist conditions and not on a warm or windy day to avoid volatilisation. Fertiliser must not be spread in very wet conditions where run-off to non-cropped areas can occur, also mud could be brought onto the public highway through mud falling off the tractor wheels. Soil damage can occur if machinery is travelling during incorrect conditions. Windy weather can also compromise the accuracy of application by altering the spread pattern when using a spinning disc applicator.

Records should be kept following the application of fertiliser, including for *Farm Assurance*. The minimum record keeping should include field name, product, date, and application rate. However, if you are in an NVZ then additional records must be kept showing that maximum permitted rates of nitrogen fertilisers are adhered to, and that they are applied within permitted timings.

Commentary

The candidate applied their excellent understanding of **field-based crop monitoring and management** to produce a comprehensive, clearly presented report, with the use of accurate technical terminology throughout eg tillers, quadrat, nutrient deficiency, and stem extension.

The candidate provided a detailed record of their crop visits, including the methods used and relevant photos supporting the recorded detail. The candidate correctly used the W pattern crop walk and a quadrat to identify representative samples of the crop away from the headland. The candidate took detailed observations on each visit such as a visual check of root establishment, and assessment of the impacts of weeds and disease.

The candidate correctly calculated the crop establishment, including in their report the data used to make the calculation, such as their count of plants in the quadrant and the sowing density provided by the assessor.

The observations accurately reflect the relevant, actual conditions recorded by the assessor in the assessor observation form, such as identification of the disease. The report includes the candidate's photos which confirm their observations.

The candidate used comprehensive analysis of their observations to inform their recommendations. For example, yellowing leaves showing evidence of nitrogen deficiency which is resolved in the fertiliser plan, and assessment of the level of weeds present, leading to appropriate recommendations (hand rogueing for the wild oats, and patch treatment of the brome).

The candidate's recommendations for integrated pest management are appropriate to their observation of the brome causing competition with the crop.

The candidate's comprehensive fertiliser plan included a realistic estimated application rate for nitrogen and timing for each of the fertilisers. The candidate considered the crop requirements to justify their approach, for example reference to the previous crop, and application of sulphur to help with utilisation of nitrogen.

The candidate identified the relevant environmental legislation and industry best practice and provided detailed explanations of the impact of these on the fertiliser plan, such as how to ensure fertilisers are only applied to the intended target.

Assessor evidence – assessor observation

Task	Assessment component number
4a) Manage crops in field and container-based systems to optimise yield and quality	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO3: Field-based crop monitoring PO3: Field-based crop management

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Assessor notes
• The candidate's findings must reflect the **actual** status of the crop when they visit, so the assessor must observe and record the status of the crop on each visit.	Visit - 01/02/23 Ground conditions: moist, recent light rainfall. Crop at growth stage 23. Roots healthy, not stunted. Minimal weeds. Some *Septoria Tritici* present. Visit – 01/03/2023 Ground conditions: dry surface. Crop at growth stage 23. Some weeds – groundsel, mayweed, cleavers, brome. Some *Septoria Tritici* present. Visit – 22/03/2023 Ground conditions: dry surface. Crop mainly at growth stage 23, some at growth stage 30. Some yellowing of leaves. Weeds - groundsel, mayweed and cleavers, brome plants, wild oats. Some competition with crop. No signs of *Septoria Tritici.*

Assessor signature	Date
Sample Assessor	As in notes

Commentary

Assessor observation records actual ground and crop conditions during the **field-based crop monitoring** to compare with the candidate's report.

Task 4b) Apply nutrients to a field-based crop

Evidence contributes to the following:

Performance outcome	Assessment themes
PO3 Manage crops in field and container-based systems to optimise yield and quality	Field-based crop monitoring
	Field-based crop management

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
field record (inorganic/organic fertiliser applications)	PO3: Field-based crop management	√		√
assessor observation, including Q&A	PO3: Field-based crop monitoring PO3: Field-based crop management		√	√
video			√	√

Candidate evidence - field record (inorganic/organic fertiliser applications)

Grass for silage

Sowing date: n/a
Seed rate: n/a

Date	Product name and analysis	Product application rate (kg/ha)	Nutrient application rate (kg/ha)				Operator
			N	P	K	S	
15.06.23	Diluted cow slurry Analysis (kg/t): 2.6 of N 1.2 of P 2.5 of K 0.7 of S	30,000	78	36	75	21	*Sample Candidate*

Commentary

The candidate accurately completed the field record as part of their **field-based crop management**. They accurately calculated the nutrient application rates based on the product analysis and product application rate.

The record meets the legislative and environmental requirements because it includes product analysis, and the date and rate of application.

This evidence in isolation provides minimal differentiation between grades, however it supports the observation of careful work with an accurate record.

Assessor evidence – assessor observation, Q&A, and video

Task	Assessment component number
4b) Apply nutrients to a field-based crop	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO3: Field-based crop monitoring PO3: Field-based crop management

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• Check safety, suitability and cleanliness of machinery and equipment.	i) The required PPE was worn throughout all activities, including safety boots, non-snag coveralls, and gloves. The following checks were carried out on the spreader: • safety – checked guards in place (PTO), checked overload (shear bolt), tested brakes, testing lights and indicators, visual check of hydraulic pipes, safe attachment to tractor • suitability – checked tyres for wear and cuts, checked level of vacuum pump oil and oiler drip rate, tested gate valves • cleanliness – checked lights were clean.
• Safe and accurate operation: even application of nutrients, assessment is of the accuracy of application using either a slurry tanker/manure spreader or fertiliser spreader/sprayer, for 3 bouts and 2 turns.	ii) The candidate applied nutrients in the field at the predetermined rate for 3 bouts and 2 turns (video): • approached the area for nutrient application at a suitable speed • paused in the area directed by the assessor • visually checked the area around them (turning around and using the side mirrors) • moved forward and turned on the spreader just off the headland (video time: 0:20) • drove the 1st bout at a suitable and consistent speed (approx. 4½ km/hr) • worked safely, constantly turning to check the spreader line and for any people/vehicles in the area

• Safely park the machinery and equipment after the nutrient application.	• stopped the spreader before taking an efficient turn, allowing a suitable buffer zone of 10 metres due to a nearby stream (time: 1:13) • restarted the spreader aligned with the previous bout. A little inconsistent in the off/on at the turn leaving a wider buffer in places • ran the 2nd bout, 2nd turn and 3rd bout the same as the first. (There was a slight gap at the end of the 2nd bout due to the narrow spread-width at the start of application (time: 2:08)) • stopped application at the headland • accurately applied the nutrient, with a consistent minimal overlap with the previous bouts, resulting in even application of the nutrient • they made smooth turns to protect the soil structure • safely parked in the area directed by the assessor: safe stop procedure was followed.

Responses to questions	***Notes** – detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
i) • What are the potential environmental impacts that may arise when inorganic fertiliser is applied?	i) Some benefits: increased yield and quality, even application of nutrients. Some negative aspects: potential run-off polluting waterways, which could lead to eutrophication.
• Explain how to set-up and calibrate a fertiliser spreader.	**Set-up** as per the manufacturer's specification eg level of lower links, correct selection of discs/spout, correct setting of disc vanes relative to tramline width, correct disc height relative to crop, top link setting for required angle of discs/spout, all depend on what type of fertiliser is being used. **Calibration** Refer to charts in the handbook for the settings based on the weight by volume of the fertiliser. Consider forward speed of the tractor, application rate, width of spread. Modern spreaders often have an app to support this activity. Spreader may have variable rate technology.
• Explain how modern technology can assist in the application of fertiliser.	Autosteer, and variable width and rate of spreading to help follow tramlines. Drones and satellite imagery to monitor the crop. Electronic mapping of fields to show soil nutrient status and therefore fertiliser requirement, and transfer data to the GPS spreader for fertiliser application resulting in less wastage. Using USB drives to transfer data between the office and machinery.
• How is the machinery and equipment cleaned, checked, and stored after use?	Use a pressure washer with detergent. Need a suitable cleaning site with environmental considerations for washings. Visual checks carried out after cleaning.

	Necessary repairs reported/actioned. Stored under cover. Safe stop procedure followed.
ii) • Explain the vegetative and reproductive growth stages of the crop in relation to its lifecycle.	ii) After grass crop main shoot emerges, leaves emerge and then it tillers. Stem elongates, it flowers and produces a seed head.
• Explain the potential end uses of this crop.	End uses depend on the crop, so silage could be used for animal feed or to make biogas in an anaerobic digester.

Assessor signature	**Date**
Sample Assessor	15/06/2023

Photo/video evidence

- Video:
  - safe and accurate operation for a minimum of 1 bout and 1 turn (typically 2-3 minutes).
    video is a separate file: Task 4b assessor video - applying nutrients (D).mp4

Note: some video evidence has been taken using a drone to provide a clear overhead view of the standard of work by the candidate. Where video evidence is required by City & Guilds for live assessments, the use of a drone is not required.

Commentary

The candidate demonstrated an excellent level of performance to efficiently carry out **field-based crop management** to a high-quality standard. The candidate worked safely throughout the task recognising and controlling risks such as wearing appropriate PPE (non-snag coveralls, safety boots).

The candidate applied their excellent understanding to comprehensively check the machinery, including safety checks (eg visual check of hydraulic pipes, testing the lights and indicators), suitability of the spreader (checked pump oil and oiler drip rate, tested gate valves), and cleanliness.

In the field, the candidate showed excellent skills and dexterity, efficiently operating the machinery to evenly apply the nutrient. For example, the candidate was already moving and just off the headland when they turned the spreader on so that they did not have excessive application in one area. The candidate constantly assessed their own work so that there was minimal overlap with previous bouts. The candidate took the correct line at the 2nd turn, recognising that the spread is narrower at the start of application. The candidate's consistent and appropriate speed ensured minimal soil structure damage. The candidate's minor inconsistency when restarting the spreader reflects the industry standard.

The candidate applied their understanding of relevant legislation by allowing a suitable buffer zone of 10 metres.

The candidate's responses to the questions showed a depth of understanding of **field-based crop monitoring and management** with detailed, relevant responses and consistent use of accurate technical terminology eg eutrophication, tillers, and elongation.

Task 4c) Harvest a field-based crop

Evidence contributes to the following:

Performance outcome	Assessment themes
PO4 Harvest crops for commercial markets	Harvesting field-based crop

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
field-based crop harvest record	PO4: Harvesting field-based crop	√		√
assessor observation, including Q&A			√	√
video			√	√

Candidate evidence - field-based crop harvest record

Field name/number/ID: Field 5	**Area (ha.):** 60	**Harvest year:** 2023
Crop: Grass	**Variety:** n/a	**Harvest date:** 23 May
Load 1 - estimated weight: 10 tonne		
Comments: Estimate based on wet crop.		

Commentary

The record of **harvesting the field-based crop** has been completed with the correct detail including the realistic estimated load weight based on the candidate's observation of the crop being acceptably wet.

This evidence in isolation provides minimal differentiation between grades, however it provides an estimation that reflects the standard of skill demonstrated in the observation, with the filled trailer.

Assessor evidence – assessor observation, Q&A, and video

Task	Assessment component number
4c) Harvest a field-based crop	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO4: Harvesting field-based crop

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Prepare tractor and trailer to harvest and store a grass silage crop: • Assess the safety and suitability of the tractor and trailer for the task: walk around check. • Set-up the tractor and trailer according to manufacturer's recommendations: hitch on, connect external services.	i) PPE was worn throughout all activities, including safety boots, non-snag coveralls and gloves. Assessment of the tractor and trailer for harvesting: Safety & suitability – general condition check (walk around), checked viewing screen/panel was clean, checked required guards in place, checked wear on ring hitch, checked condition, pressure (using gauge) and wear of tyres, visual check of condition of hydraulic, pneumatic, and electrical pipes, cables, and fittings. The trailer was attached to the tractor as follows: • visual check of pick-up hitch on the tractor and the ring-hitch on the trailer for condition • lower links were wound up to their highest position • visual check of protective PTO stub cover to ensure in place • tractor was started and carefully reversed to align with the trailer • pick-up hitch was aligned and connected in one move: After latching the pick-up hitch mechanism, the link arms were lowered slightly to take the pressure off the lift rods, and the lower links set so that they cleared the trailer draw bar • engine was stopped, and the key removed and placed into the candidate's pocket • exited the tractor in the correct direction • pick-up hitch connection was visually checked

	• lift rods were physically checked to ensure they had movement • hydraulic connections were checked for cleanliness, cleaned, and inserted into the tractor (tipping, tail gate) • pneumatic connections were checked for cleanliness, cleaned, and inserted into the tractor (brakes) • electrical connects were made • trailer shoe was removed and stored in the correct position on the chassis • good all-round observation was noted during all machinery operation. Safety & suitability: tested brakes, checked lights and indicators (working and clean), checked hydraulic controls (tipping the trailer fully, opening the tailgate fully).
Operate the tractor and trailer to harvest a grass silage crop and transport to store: • Safely and efficiently operate tractor and trailer to offload the crop from the harvester: one full load. • Safely and legally transport the crop to a specified location – if travelling on a public highway, it is acceptable for a licensed driver to assist if the candidate does not hold a licence. • Safely offload the crop at the store. • Safely park the machinery and equipment. • Apply precise and controlled movements of equipment to show physical dexterity. • Monitor quality of their work, making adjustments as	ii) The candidate collected one load off the harvester (video): • approached the harvester at a suitable speed • quickly matched the speed of the harvester for one full load (2 bouts and 2 turns); adjusted speed at the turns • carefully positioned the trailer under the harvester spout, starting with filling the trailer at the rear (video time: 0:05) (The harvester maintained a constant speed on the bouts) • monitored filling by carrying out controlled adjustments to their speed so that the load was eventually evenly distributed in the trailer, one instance of minimal spillage (time: 0:15, 1:50) • on turns, they stayed clear of the tail swing of the harvester (time: 0:40) • worked safely, constant observation to check the trailer alignment to the harvester and for any people or other vehicles in the area • they promptly and safely drove to the silage clamp, observing the agreed route, and using mirrors and indicators as required. They offloaded one load of the harvest into the silage clamp (video): • visually checked the area around them before they began the manoeuvre (turning around and using the side mirrors) • reversed the trailer into the clamp in a straight line, and at a steady and controlled, safe speed (time: 2:08) • adjusted alignment to clamp to enable tipping the load in the area directed by the loader operator, with no damage to crop • worked safely, constantly turning to check the trailer alignment to the clamp and for the position of the loader in the clamp • used precise and controlled movements throughout the manoeuvre • safely parked in the area directed by the assessor: safe stop procedure was followed.

required, to meet objectives.	

Responses to questions	***Notes*** *– detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• What parts of the trailer need regular lubrication?	It depends on the trailer, but it might need lubrication on sprung draw bar, axle spring connections, trailer brake linkage pivot points, and the tail gate pivot points and hydraulic connections.
• What could make the tractor and trailer incompatible?	External service fittings, electrics, pick-up hitch type, size (ratio) of machinery and equipment eg tractor isn't large enough for the trailer in some locations, such as a sloped field.
• Explain how to minimise soil damage when harvesting crops.	Use harvester, tractors, and trailers with wide tyres/tracks and lower tyre pressure to reduce compaction. Wait for suitable weather and ground conditions so do not leave excessive wheel marks and ruts or compact the ground. Use trailers with multiple axles to spread the load across more axles. Use steering axles to reduce scuffing of the ground.
• Explain the considerations at harvesting to produce good quality grass silage.	For grass silage the quality depends on growth stage (younger grass is higher energy), sugar levels (highest when cut in sunny weather), use of an additive (to aid fermentation) and dry matter (more or less wilting duration). May sacrifice quantity for the better quality cutting when it's younger (not gone to head). Chop length depends on animal requirements.

Assessor signature	**Date**
Sample Assessor	23/05/2023

Photo/video evidence

- Video:
  - safely and efficiently operate tractor and trailer to offload the crop from the harvester:
    - drive up to the harvester (typically 2 minutes)
    - last 1-2 minutes of a trailer loading
  - safely offload one load of the crop at the store (reversing, tipping the load). video is a separate file: Task 4c assessor video - harvesting crop (D).MOV

Note: some video evidence has been taken using a drone to provide a clear overhead view of the standard of work by the candidate. Where video evidence is required by City & Guilds for live assessments, the use of a drone is not required.

Commentary

The candidate demonstrated an excellent level of performance to efficiently carry out the **harvesting of the field-based crop** to a high standard. They worked safely throughout the task, recognising and controlling risks such as wearing appropriate PPE (coveralls, safety boots) and exiting the tractor in the correct direction.

The candidate comprehensively assessed the safety and suitability of the machinery, including checking guards and visual checks of pipes, cables and fittings. The candidate also checked the tyre pressures with a gauge.

The candidate's set-up of the machinery was excellent, considering the detailed requirements of the task that resulted in efficient completion of the set-up: wound up the lower links to their highest position so that they didn't foul the trailer when moving it into position, lowered the link arms to take the pressure off the lift-rods, physically checked that the lift rods were no longer carrying the weight of the trailer which would cause unnecessary wear, and made sure that the hydraulic and pneumatic connectors were clean before connection.

Once the tractor and trailer were connected, the candidate comprehensively checked their safety and suitability by testing the brakes, and fully testing the hydraulic controls (fully tipping the trailer, and fully opening the tailgate).

The candidate showed excellent skill and dexterity by safely reversing the tractor to align with the trailer for hitching on. In the field, the candidate safely and efficiently operated the machinery to collect one load off the harvester. For example, the candidate controlled their speed to quickly match the harvester, aligning the spout to start filling the trailer from the rear. As the trailer filled, the candidate used controlled adjustments to achieve an efficient, even load without waste. The candidate later safely and precisely reversed the trailer into the silage clamp to offload in the correct area with no crop loss.

The candidate's responses to the questions showed a depth of understanding with detailed, relevant responses and consistent use of accurate technical terminology eg trailer parts, external service fittings, and wilting (rather than 'dry').

Task 4d) Assess a stored field-based combinable crop

Evidence contributes to the following:

Performance outcome	Assessment themes
PO4 Harvest crops for commercial markets	Crop storage

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
field-based combinable crop storage monitoring	PO4: Crop storage	√		√
assessor observation			√	√
photos			√	√

Candidate evidence - field-based combinable crop storage monitoring

Store name/number:	**Bin/bulk/bay number:**	**Crop stored:**	**Typical crop specification:**
Guilds Estate Long Term Store (2)	Bulk store 1	Wheat	**Temperature:** 10°C **Moisture:** Maximum 15% **Hectolitre weight:** Minimum 72kg/hl

Date	**Location in store reading taken**	**Temp °C**	**Moisture %**	**Hectolitre weight kg/hl**	**Insect traps checked**	**Tick if present**		**Action taken/Comments/Recommendations**
						Rodents	Birds	
23/03/2023	L/H Side	12°C	14.5%	78kg/hl	Yes (no evidence)			Temperature is within acceptable range for time of year but will need to monitor and use cold air to ensure grain is at <10°C. Moisture is acceptable for crop specification and appropriate cooling of grain will help prevent moisture content increasing. Hectolitre weight acceptable for crop specification. Monitor weekly: temperature and moisture.
23/03/2023	R/H Side	17°C	15%	77kg/hl	Yes (positive)	√ (signs)		Temperature is too high for the time of year. Cold air to be blown until temperature is within acceptable range. Aim to cool to <10°C. Moisture is at the top of the range for being acceptable for crop specification and appropriate cooling of grain will help prevent moisture content increasing. Insect activity present (beetle in traps) and cooling of the grain will help with reducing their activity. Evidence of rodent activity (tail swipes). Actions: inspect, repair as needed and monitor. Advise pest controller of situation. Traps to be used in store, bait to be used outside of store.

								Hectolitre weight acceptable for crop specification. Monitor every second day during cold air blowing period to ensure temperature reduces. Monitor insect and rodent activity until signs are no longer evident.

Commentary

The candidate provided a comprehensive record of their **stored crop** monitoring with their relevant, detailed observations. The candidate's approach to the task is clearly recorded with sampling from two places, each recorded in a separate line.

The candidate applied their excellent understanding to analyse their data against the crop specification provided by the assessor. Where their analysis resulted in the need for action, the candidate made appropriate, realistic recommendations eg temperature on right hand side of store is too high for time of year, so cold air should be blown to change the temperature of the **stored crop**.

Assessor evidence – assessor observation and photos

Task	Assessment component number
4d) Assess a stored field-based combinable crop	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO4: Crop storage

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
• Correct use of sampling equipment. • Assessment of representative samples of the crop. • Disposes of waste appropriately.	PPE (dust mask and latex gloves) worn during the task. **Insects/rodents/birds** Rodent activity (tail swipes across part of heap) was detected prior to disturbing the heap by other monitoring activities. The candidate then checked all likely areas of the store for entry points. They located a small hole at the base of a wooden door. Insect traps were checked by carefully locating marker tags, lifting the trap from the sub-surface of the grain and emptying onto a clean sheet of white paper. A magnifier was used to check for insects. Correct identification of a beetle. Each trap was checked individually. Following emptying, the traps were placed back into the same locations. **Representative sampling** Sample for moisture collected using grain sampling spear from a range of locations and depths. The heap was divided into two halves (L/H and R/H) to avoid an excessively sized 'average' sample. The samples were mixed in a bucket for visual assessment (photo 1). They tested the sample for moisture using the correct moisture meter settings and procedure (photo 2). The hectolitre collection vessel was checked for cleanliness prior to use. The samples already collected in the bucket (for the moisture testing) were used for this test to ensure an 'average' kg/hl was obtained. The vessel was filled to the top (photo 3). The scale was used to weigh the vessel containing the collected sample (photo 4), and the weight was recorded. The scale reading was correctly interpreted.

	A temperature probe was used correctly (photo 5). The correct crop was chosen from the control screen and the end of the probe was checked to ensure it was clean and not contaminated. The probe was inserted into a range of locations and depths and the temperature was read as soon as the screen reading had stabilised. Each reading was noted, and an average calculated at the end of the process. The heap was divided into two halves (L/H and R/H) to avoid an excessive area for 'average' readings. Candidate's readings and observations were entered onto the storage monitoring record. No abnormally high readings were detected during this activity. Samples were returned to the heap.

Assessor signature	**Date**
Sample Assessor	23/03/2023

Photo/video evidence

- Photos:
    - collection and assessment of the crop sample: visual assessment, use of meter, probe and weigher.

Photo 1 (assessor) Collection and assessment of the crop sample: visual assessment

Photo 2 (assessor) Assessment of the crop sample: moisture meter

Photo 3 (assessor) Assessment of the crop sample: collection vessel

Photo 4 (assessor) Assessment of the crop sample: weigher

Photo 5 (assessor) Assessment of the crop sample: use of probe

Commentary

The candidate took a careful and thorough approach to assessing the presence of insects, rodents and birds in the **stored crop**: observing appropriate health and safety precautions (dust mask, gloves), checking for entry points, checking traps individually to ensure that the location of activity was correctly recorded, and undertaking the observations before disturbing the store. The candidate returned the traps to the same locations to enable continued monitoring.

The candidate took samples and readings from two different areas of the stored crop to give them an excellent representation of the status of the **stored crop**. Calculating the average readings gave reliable data which accurately recorded the status of the **stored crop**.

The candidate thoroughly prepared the equipment, ensuring it was clean and the temperature probe was set to the correct crop before use. The candidate used the equipment accurately, ensuring that they waited for the temperature probe reading to stabilise before recording the temperature. These actions produced reliable, accurate results on which to base their recommendations.

Task 5 – Estate maintenance

Task 5a) Maintain a stock-proof boundary

Evidence contributes to the following:

Performance outcome	Assessment themes
PO5 Maintain the areas surrounding the crop production environment	Business management
	Estate maintenance

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
assessor observation	PO5: Business management PO5: Estate maintenance		√	
photos	PO5: Estate maintenance		√	

Task 5b) Maintain a hedge

Evidence contributes to the following:

Performance outcome	Assessment themes
PO5 Maintain the areas surrounding the crop production environment	Business management
	Estate maintenance

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
assessor observation	PO5: Business management PO5: Estate maintenance		√	
photos	PO5: Estate maintenance		√	

Task 5c) Maintain a ditch/drain

Evidence contributes to the following:

Performance outcome	Assessment themes
PO5 Maintain the areas surrounding the crop production environment	Business management
	Estate maintenance

Evidence	Assessment themes	Candidate producing	Assessor producing	Included in this GSEM
assessor observation	PO5: Business management PO5: Estate maintenance		√	√
photos	PO5: Estate maintenance		√	√

Assessor evidence – assessor observation and photos

Task	Assessment component number
5c) Maintain a ditch/drain	8717-400
Candidate name	**Candidate number**
Sample Candidate	CG12345
Centre name	**Assessment themes**
Sample Centre	PO5: Business management PO5: Estate maintenance

Complete the table below referring to the relevant marking grid, found in the assessment pack. Do not allocate marks at this stage.

Assessor observation	Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Carry out remedial work to ensure free flow of water: • Correct selection of tools, equipment and machinery. • Correct pre-use checks on tools, equipment and machinery.	Selected PPE – safety boots, gloves, eye protection. The tools were selected for the task, including the appropriate pre-use checks: • Drain rods with spiral attachment – used for inserting into drain and extracting the blockage (vegetation). Drain rods were checked for damage prior to use. • Slash hook – used for cutting overgrown vegetation around the area adjacent to the drain outfall. Checked to ensure head and handle attached. • Prong – used for clearing cut vegetation from ditch. The handle connection to the metal prong was checked prior to use.
• Safe and efficient use of tools, equipment and machinery as appropriate to the task. • Disposes of waste appropriately.	Photo 1 – area before task undertaken. Photo 2 – area after task undertaken. The candidate carried out the task in the following order: 1. The excessive vegetation around the outfall was cut with the slash hook and removed: candidate checked area for other people before starting work. They ensured that they had a stable footing prior to swinging the slash hook. Vegetation was cleared away using the prong. No damage by the candidate. 2. The blockage was cleared from the drain using the drain rod and spiral attachment (turned clockwise). No damage by the candidate. 3. Excessive vegetation put high up the bank to rot down. 4. All equipment was cleaned and stored.

	Outcome was a free flowing drain and ditch. The candidate carried out all tasks in a safe manner and used appropriate PPE throughout (safety boots, gloves when using the drain rods and slash cutter, eye protection).

Assessor signature	**Date**
Sample Assessor	23/03/2023

Photo/video evidence

- Photos:
    - ‘before’ and ‘after’ the candidate has undertaken the task: whole area.

Photo 1 (assessor) Before the candidate has undertaken the task: whole area

Photo 2 (assessor) After the candidate has undertaken the task: whole area

Commentary

The candidate applied an excellent understanding of **estate maintenance** to effectively clear the drain to a high standard. The candidate recognised **business management** needs by moving the waste vegetation high up the bank to avoid it blocking any pipes further down the ditch.

The candidate considered the detailed requirements of the **estate maintenance** task to select a comprehensive range of tools and equipment, recognising the need to cut and remove vegetation, and clear the blockage. For example, the candidate selected the spiral attachment for the drain rods so that they could effectively clear the blockage, and a prong for removing the cut vegetation. All tools and equipment were checked before use.

The candidate worked safely throughout the task, for example wearing appropriate PPE, checking the area for other people before starting work and making sure they had a stable footing before swinging the slash hook.

The candidate used the tools and equipment correctly. For example, they turned the drain rods clockwise to avoid the threaded joints becoming unscrewed.