

Assessment Schedule – 2013

Agricultural and Horticultural Science: Demonstrate knowledge of soil management practices (90919)

Evidence Statement

Question One – Effluent application

Not Achieved		Achievement		Achievement with Merit		Achievement with Excellence	
		“Demonstrate knowledge” requires describing how soil management practices are carried out.		“Demonstrate in-depth knowledge” requires explaining why soil management practices, or steps within practices, are carried out.		“Demonstrate comprehensive knowledge” requires applying knowledge of soil management practices to given situations. This may involve comparing and/or contrasting, or justifying management practices.	
N1	N2	A3	A4	M5	M6	E7	E8
Describes ONE idea at the Achievement level.	Describes TWO ideas at the Achievement level.	Describes THREE ideas at the Achievement level.	Describes FOUR ideas at the Achievement level.	Explains THREE ideas at the Merit level.	Explains FOUR ideas at the Merit level.	Justifies the method chosen.	Fully justifies the method chosen by comparing and contrasting.

N0 = No response; no relevant evidence.

Examples of evidence for answers

Describe (Achievement) how effluent is spread

- From the back of a spreader attached to a tractor/truck.
- Through pipes out to the paddocks and through a rotating effluent spreader/irrigator.
- As a solid, and then ploughed in.

Describe (Achievement) / **Explain** (Merit) how effluent affects the properties of soil

- Increases nutrients in the soil (Achievement), which are therefore available for plants to uptake and use for growth (Merit).
- Nutrients are already dissolved in water (Achievement), so they are readily available to the plant (Merit).
- Water is also added, increasing soil water availability (Achievement), and so water is available for plant processes (Merit).
- Effluent contains organic matter, which will help to glue soil peds/particles together (Achievement), and therefore improve/maintain soil structure (Merit).
- Increased levels of moisture and organic matter could lead to an increase in biological activity (Achievement), further breaking down organic matter and releasing nutrients (Merit), and improving structure (drainage and aeration) through tunnelling (Merit).

- Increased number of macro pores, which will improve drainage and aeration.
- Increased organic matter, and therefore increased water-holding capacity.
- Can be acidic, so could lower pH.

Describe (Achievement) / **Explain** (Merit) / **Justify** (Excellence) why one practice is preferable to the other

Justifications should be linked to the soil texture (sandy loam). Soil type means less water and more prone to leaching of nutrients (M).

Irrigation	Effluent application
<p><i>Advantages</i></p> <ul style="list-style-type: none"> • Can regulate the amount / flow of water. • Nutrients can be added if needed. • Doesn't smell. • Water is available for photosynthesis / plant processes. • Water is available for microbial activity. 	<p><i>Advantages</i></p> <ul style="list-style-type: none"> • Recycles nutrients which are available for plant processes. • Cheap / cost-effective, as it is a waste product from the sheds. • Good / effective use of waste product. • The organic matter improves the sandy soil structure. • Organic matter encourages microbial activity. • Water is available for photosynthesis / plant processes • Water is available for microbial activity. • Organic matter is darker, so the soil warms up, helping to speed up plant processes / better growth.
<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> • Only applies water, and not nutrients. • Can have negative environmental effects if water is taken from rivers and streams, as it lowers the water supply downstream / overall. • Can lead to leaching / saturated soil if it is overdone. 	<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> • Can add excess water to soil, especially in winter, which leads to leaching into waterways. • Over-application can also cause leaching, as the soil exceeds saturation point / becomes saturated. • Can have unpleasant odour.

Question Two – Growing crops

Not Achieved		Achievement		Achievement with Merit		Achievement with Excellence	
		Describes how soil management practices are carried out.		Links ideas to explain why soil management practices, or steps within practices, are carried out.		Applies knowledge of soil management practices to given situations. This may involve comparing and contrasting or justifying management practices.	
N1	N2	A3	A4	M5	M6	E7	E8
Describes ONE idea at the Achievement level.	Describes TWO ideas at the Achievement level.	Describes THREE ideas at the Achievement level.	Describes FOUR ideas at the Achievement level.	Explains THREE ideas at the Merit level.	Explains FOUR ideas at the Merit level.	Justifies the method chosen.	Fully justifies the method chosen by comparing and contrasting.

N0 = No response; no relevant evidence.

Examples of evidence for answers

Describe (Achievement) / **Explain** (Merit) the actions taken to prepare a seedbed

- Turns over soil (Achievement), which turns in organic matter and/or loosens any hard pans/larger clumps (Merit).
- Breaks up larger clumps (Achievement), so the soil has a fine tilth (Merit).
- Level the soil with a rake or harrows (Achievement), so that the seeds are all planted at the same depth for even/successful emergence (Merit).
- Spray weeds/pasture before cultivating, to kill existing organic matter (Achievement), so that the plants do not compete with the seedlings (Merit).
- Add lime or a base fertiliser (Achievement) to correct low nutrient levels in the soil (Merit).
- Add compost (Achievement) to improve soil structure, water-holding, and nutrient levels (Merit).

Describe (Achievement) crop rotation

Alternating the planting of several crops so that the same one is not planted in the same space every year.

Describe (Achievement) / **Explain** (Merit) / **Justify** (Excellence) why one practice is preferable to the other

Yield is increased with crop rotation.

Crop rotation	Mono-cropping
<p><i>Advantages</i></p> <ul style="list-style-type: none"> • Varying root depths of different plants provides access to different nutrients. • Reduces pests and disease by breaking their lifecycle, so that the pest/disease dies out. • Different plants use different nutrients, so all nutrients in the soil are utilised. • Varying root depths can improve drainage and aeration. 	<p><i>Advantages</i></p> <ul style="list-style-type: none"> • A large amount of a crop can be grown, which can increase profits for that year. • A farmer can specialise / be a primary producer of one type of crop, so they don't have to buy different harvesting equipment.
<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> • Some crops are not as profitable as others, yet might be good for soil improvement. • Similar crops can host the same disease, so the pest/disease may remain in the soil. 	<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> • The crop could host and encourage build-up of pests / diseases in the soil. • The soil can become depleted of particular nutrients, and crop yield will be reduced.

Question Three – Lime and fertiliser

Not Achieved		Achievement		Achievement with Merit		Achievement with Excellence	
		Describes how soil management practices are carried out.		Links ideas to explain why soil management practices, or steps within practices, are carried out.		Applies knowledge of soil management practices to given situations. This may involve comparing and contrasting or justifying management practices.	
N1	N2	A3	A4	M5	M6	E7	E8
Describes ONE idea at the Achievement level.	Describes TWO ideas at the Achievement level.	Describes THREE ideas at the Achievement level.	Describes FOUR ideas at the Achievement level.	Explains TWO ideas at the Merit level.	Explains THREE ideas at the Merit level.	Justifies the method chosen.	Fully justifies the method chosen by comparing and contrasting.

N0 = No response; no relevant evidence.

Examples of evidence for answers

Describe (Achievement) how NPK affects plant growth

- N helps form chlorophyll, aids leaf growth, and forms proteins in plants.
- P is important in growing areas, eg good for root, seedling, flower and/or fruit development.
- K promotes chlorophyll production, gives strength to cells, helps disease resistance, and improves flower / seed / fruit quality.

Explain (Merit) how this fertiliser affects soil properties, and how this affects plant growth

- Increases the nutrient levels in the soil (Achievement), which means that more nutrients are available for plant processes (Merit).
- The chemical properties of soil are improved, so more nutrients are available (Achievement) to be taken up by the plant roots (Merit).
- More nutrients are available to be taken up by plants (Achievement), which will improve plant growth / increase yield (Merit).
- Change in acidity can reduce microbe and earthworm activity.
- Can add specific amounts / types of nutrients for particular crops.

Describe (Achievement) / **Explain** (Merit) / **Justify** (Excellence) why applying lime is the preferred practice

- It unlocks soil nutrients and makes them available to plants, whereas fertiliser just adds more nutrients.
- Lime encourages activity by microbes and worms, by making soil less acidic. Microbes and worms go on to break down organic matter, which also increases nutrient levels.
- Increased earthworm activity, due to less acidic soil, will improve drainage and aeration through their tunnelling, whereas fertiliser has no effect on soil drainage or aeration.
- Lime can flocculate clay particles together and improve soil structure, whereas fertiliser has no effect on soil structure.
- Fertiliser can lower the pH of soil and make nutrients less available and/or discourage soil organisms, whereas lime increases pH.
- Both are easy to apply.

Judgement Statement

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 6	7 – 12	13 – 18	19 – 24