

Assessment Schedule – 2021

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

Assessment Criteria

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.

Evidence

Question ONE	Sample evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	<ul style="list-style-type: none"> Fertiliser is applied by a mini spreader attached to the back of a quad or a tractor, or by an aerial top-dressing plane. 	Describes how fertiliser is applied to soil.		
(b)	<ul style="list-style-type: none"> Applying fertiliser prior to rainfall <u>allows the nutrients to be dissolved in the soil so they can be taken up by the roots and used by the plant.</u> Best applied during a plant's active growing cycle <u>so the nutrients are being used by the plant.</u> Apply in low wind <u>to ensure that the areas that need the nutrients are receiving them. This reduces fertiliser being lost into waterways.</u> 	Describes the best environmental conditions to apply fertiliser.	Describes the best environmental conditions to apply fertiliser and explains why, including <u>underlined</u> -type evidence.	

<p>(c)</p>	<p>Feed Pad <i>Advantages</i></p> <ul style="list-style-type: none"> Animals are not grazing on the soil, <u>which reduces the negative impacts on soil structure.</u> Soil is less likely to be compacted, <u>which increases the amount of aeration in the soil and allows for an increased rate of root respiration.</u> More air in soil means the soil will be warmer, <u>which increases the rate of plant processes like photosynthesis and respiration, increasing plant growth.</u> The soil is less compacted, <u>which means that it has better drainage and is a better environment for micro-organisms, increasing the breakdown of organic matter.</u> Effluent can be collected, stored, and then applied responsibly, <u>but when feeding out in a paddock, it means more concentrated deposits of effluent.</u> <p><i>Disadvantages</i></p> <ul style="list-style-type: none"> Concrete pads can cause lameness / feet damage in cattle. <p>Feeding Out <i>Advantages</i></p> <p>Organic matter is returned to the soil, <u>which increases the nutrients available, or encourages microbial activity.</u></p> <p><i>Disadvantages</i></p> <ul style="list-style-type: none"> Supplementary feed is commonly fed in winter when grass growth or temperature is low, and rainfall is high. In winter, high rainfall can lead to pugging and soil compaction, <u>which causes poor drainage and less aeration in soil, slowing root respiration and leading to decreased plant growth.</u> Soils with high levels of water have a cooler temperature, <u>reducing the rate of reaction for photosynthesis and respiration.</u> High water levels in soil creates a less desirable habitat for micro-organisms, <u>which slows down the breakdown of organic matter and reduces nutrient uptake.</u> In the long term, soil is damaged through pugging or compaction, <u>and can take a long time to recover, leading to slow growth of grass in spring.</u> Pugged soil can cause foot problems for cattle. 	<p>Describes how a farmer would use a feed pad.</p>	<p>Explains why a farmer would use a feed pad, including <u>underlined</u>-type evidence</p>	<p>Justifies why a farmer would use a feed pad by comparing and contrasting it to feeding out in paddocks.</p> <p>Note: for E7/E8 candidates must justify why feed pads are a better method than feeding out in a paddock.</p>
------------	--	--	---	--

N1	N2	A3	A4	M5	M6	E7	E8
Describes ONE idea at Achievement level.	Describes TWO ideas at Achievement level.	Describes THREE ideas at Achievement level.	Describes FOUR ideas at Achievement level.	Explains THREE ideas at Merit level.	Explains FOUR ideas at Merit level.	Justifies the method chosen.	Justifies the method chosen by comparing and contrasting with another method.

N0 = No response; no relevant evidence.

Question TWO	Sample evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	<ul style="list-style-type: none"> • Sandy Clay Loam. 	<p>Names the soil type.</p>		
(b)	<ul style="list-style-type: none"> • Clay soil has the smallest particle size, and individual particles are round and flat, <u>allowing it to hold water, therefore having good water-holding capacity and poor drainage.</u> • High levels of water in soil, <u>reduces the amount of aeration and therefore clay soils take longer for the temperature to change.</u> • <u>Clay holds more nutrients leading to increased growth.</u> 	<p>Describes how clay soil's texture affects the physical properties, in general terms.</p>	<p>Explains how clay soil's texture affects the physical properties, including <u>underlined</u>-type evidence.</p>	
(c)	<p>Direct drilling</p> <p><i>Strengths</i></p> <ul style="list-style-type: none"> • Soil is not cultivated prior to the planting of a new crop or pasture, <u>meaning the soil structure is not changed or damaged.</u> • Better soil structure means the soil has better drainage and aeration, increasing the rate of respiration and plant growth. • Compared to cultivation, machinery has to pass over the soil less, <u>which reduces the risk of soil structure being damaged.</u> <p><i>Weaknesses</i></p> <ul style="list-style-type: none"> • May reduce rates of seed germination, as the soil needs to be fine enough for the seed to be in contact with water and nutrients. • New crop is in competition with previous crop for water and nutrients, <u>which reduces growth rates.</u> <p>Increasing wheelbase on machinery</p> <p><i>Strengths</i></p> <ul style="list-style-type: none"> • Weight of machinery <u>is spread over a wider area, which decreases soil compaction where the machinery travels.</u> • <u>Less compaction improves soil drainage, and soil temperature, which increases the rate of respiration and rate of reaction in plant growing processes.</u> 	<p>Chooses a method of preventing over-compaction. Gives some details.</p>	<p>Chooses a method of preventing over-compaction and links ideas, including <u>underlined</u>-type evidence.</p>	<p>Justifies a method of preventing over-compaction by comparing and contrasting it with avoiding the use of heavy machinery.</p> <p><i>Note: candidates must use a method that prevents over-cultivation, e.g. direct drill, minimum tillage, increasing wheelbase, or using different pasture species.</i></p> <p><i>Unaccepted methods: lime application, putting in a drainage system, small scale methods or anything that is about improving soil structure rather than minimising damage.</i></p>

<p><i>Weaknesses</i></p> <ul style="list-style-type: none"> • Doesn't decrease the amount of cultivation done, <u>which means that soil structure could be damaged.</u> • Finer soils are more likely to be compacted <u>and therefore have poor drainage, and less aeration, decreasing the air for respiration and slowing plant growth.</u> <p>Avoiding heavy machinery</p> <p><i>Strengths</i></p> <ul style="list-style-type: none"> • Lighter machinery <u>reduces soil compaction and preserves soil structure.</u> • Soil with better structure has better drainage, <u>which reduces the amount of water in soils and increases the aeration, allowing for better root respiration and improved growth.</u> • <u>Less water also means the soil will be warmer, which increases the rate of reactions and increases growth.</u> <p><i>Weaknesses</i></p> <ul style="list-style-type: none"> • Use of lighter machinery after heavy rainfall may still lead to some soil compaction, which damages soil structure and decreases soil drainage and temperature, <u>reducing root respiration and the rate of reaction.</u> <p>Other responses (methods) could include:</p> <ul style="list-style-type: none"> • reducing the number of pass overs • minimum tillage • wider tyres • crop rotation • aerial top dressing • polyculture species within a paddock. 	
---	--

N1	N2	A3	A4	M5	M6	E7	E8
Describes ONE idea at Achievement level.	Describes TWO ideas at Achievement level.	Describes THREE ideas at Achievement level.	Describes FOUR ideas at Achievement level.	Explains THREE ideas at Merit level.	Explains FOUR ideas at Merit level.	Justifies the method chosen.	Justifies the method chosen by comparing and contrasting with another method.

N0 = No response; no relevant evidence.

Question THREE	Sample evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	<p>Cultivation methods:</p> <ul style="list-style-type: none"> • rotary hoe • power harrow • traditional plough. <p><i>*Due to large crop context, turning over with a fork is not a suitable method.</i></p> <p>Cultivation is done to:</p> <ul style="list-style-type: none"> • remove existing weeds, <u>which reduces the competition of nutrients</u> • <u>increase organic matter by burying crop residue</u> • incorporate base fertilisers and lime, to <u>replace lost nutrients and condition the soil</u> • alleviate soil compaction, to increase drainage and aeration, <u>and improve photosynthesis and respiration</u>. Prepare a level seedbed for even germination. 	<p>Describes a cultivation method suitable for a large crop.</p>	<p>Describes a cultivation method suitable for a large crop and explains why cultivation is done before planting, including <u>underlined</u>-type evidence.</p>	
(b)	<ul style="list-style-type: none"> • Strawberries do not like to be waterlogged, and the <u>roots will rot easily in such conditions</u>. • Planting in mounds prevents the soil from becoming too damp. • Strawberry plants need good draining and aerated soil, <u>which increases plant growth through plant processes, such as respiration</u>. • Soil temperature will increase as more soil is exposed to the sunlight, <u>which will increase the rate of plant processes</u>. • Soil temperature warms easier with better drainage, <u>which will increase the rate of plant processes</u>. • Mounds allow the water to drain straight to the roots, <u>which increases the amount of water available for photosynthesis and for dissolving nutrients, which increases the crop yield</u>. • Keeping fruit off the ground <u>to prevent rot</u>. 	<p>Describes a reason crops are planted on mounds.</p>	<p>Explains why crops are planted on mounds, including <u>underlined</u>-type evidence.</p>	

<p>(c)</p>	<p>Irrigation <i>Strengths</i></p> <ul style="list-style-type: none"> Increases water availability, <u>allowing for photosynthesis and nutrients to be dissolved in soil.</u> <p><i>Weaknesses</i></p> <ul style="list-style-type: none"> Needs to be applied frequently at low volumes <u>because sand has poor water-holding capacity.</u> Irrigation doesn't add nutrients to the soil. It doesn't add organic matter <u>and therefore doesn't increase the number of microbes in the soil.</u> <u>Leaches nutrients from soil.</u> <p>Compost <i>Strengths</i></p> <ul style="list-style-type: none"> <u>Acts like a sponge</u> and absorbs water, which improves the water-holding capacity of the soil, <u>increasing photosynthesis and how easily nutrients can be dissolved.</u> Compost makes the soil darker, which increases the soil temperature, <u>increasing the rate of reaction for photosynthesis and respiration.</u> Compost is organic matter and increases the number of microbes in soil, <u>which increases the breakdown of nutrients that can be used by the plant for plant growth.</u> <p><i>Weaknesses</i></p> <ul style="list-style-type: none"> Doesn't immediately add water to soil, <u>therefore reducing water availability in the short term.</u> 	<p>Describes a reason a farmer would use compost in general terms.</p>	<p>Explains why a farmer would use compost rather than irrigate sandy soils, making links, including <u>underlined</u>-type evidence.</p>	<p>Justifies why a farmer would use compost rather than irrigate sandy soils, by comparing and contrasting irrigation with adding compost.</p> <p>Note: for E7/E8 candidates must justify why compost is better than irrigation to improve water availability.</p> <p>Candidates should identify the biggest issue for sand soils is their fast drainage.</p>
------------	---	---	--	---

N1	N2	A3	A4	M5	M6	E7	E8
Describes ONE idea at Achievement level.	Describes TWO ideas at Achievement level.	Describes THREE ideas at Achievement level.	Describes FOUR ideas at Achievement level.	Explains THREE ideas at Merit level.	Explains FOUR ideas at Merit level.	Justifies the method chosen.	Justifies the method chosen by comparing and contrasting with another method.

N0 = No response; no relevant evidence.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 13	14 – 18	19 – 24