

**Assessment Schedule – 2014**

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

**Evidence Statement**

**Question One: Coastal property**

Not Achieved		Achievement		Achievement with Merit		Achievement with Excellence	
		“Demonstrate knowledge” requires <b>describing</b> how soil management practices are carried out.		“Demonstrate in-depth knowledge” requires <b>explaining</b> why soil management practices, or steps within practices, are carried out.		“Demonstrate comprehensive knowledge” requires <b>applying knowledge</b> 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 Achievement level.	Describes TWO ideas at Achievement level.	Describes THREE ideas at Achievement level.	Describes FOUR ideas at Achievement level.	Explains TWO ideas at Merit level.	Explains THREE ideas at 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**

**Defines** (Achievement) the term “mulch”

Organic or inorganic matter (eg bark, straw, sawdust, grass clippings, pea straw, newspaper, plastic, mulch clothe) that is placed on top of the soil.

**Describes** (Achievement) / **Explains** (Merit) how mulch affects the properties of soil and how these effect plant growth

- Helps to prevent loss of soil water through evaporation (Achieve), which means there is more water available for plant processes, which will increase growth (Merit).
- Because it is layered on top of the soil, and not dug in, it will help to hold the heat in the soil/ maintain a warm soil temperature (Merit), speeding up chemical processes / plant processes, which will increase growth rates. (The statement must link ideas to show Merit).
- If the mulch is organic, the layer on top of the soil will eventually rot down (Achieve) and add nutrients to the soil (Merit), which will be available for plants to use and will improve / increase growth (Merit).
- Mulch will prevent weeds growing (Achievement) and competing with wanted plants for water, nutrients, and light (Merit).
- Protects top layer from wind / water erosion (Achievement)

**Describes** (Achievement) / **Explains** (Merit) / **Justifies** (Excellence) why one practice is preferable to the other

Both increase soil nutrient levels, thereby increasing the nutrients available for plant growth.

<b>Inorganic fertiliser</b>	<b>Compost</b>
<p><i>Advantages</i></p> <ul style="list-style-type: none"> <li>• Adds nutrients to the soil (Achievement), which are then available for plant growth (Merit).</li> <li>• Contains specific nutrients/specific ratios (Achievement), which means the grower can apply only what the soil/plants need (Merit).</li> <li>• Applied in specific ratios (Achievement), so there is little waste/the grower knows how much has been applied (Merit).</li> <li>• Can be short or slow release (Achievement).</li> </ul>	<p><i>Advantages</i></p> <ul style="list-style-type: none"> <li>• Adds nutrients to the soil (Achievement), which are then available for plant growth (Merit).</li> <li>• Helps retain soil water/prevents it from evaporating (Achievement), meaning more water is available for plant processes (Merit).</li> <li>• Binds soil particles together (Achievement), which improves soil water retention (Merit).</li> <li>• Maintains warmer soil temperature (Achievement), which increases chemical reactions in the roots (Merit).</li> <li>• Increases microbe activity/increases earthworm activity (Achievement), which breaks down organic matter and makes nutrients available for plants (Merit).</li> </ul>
<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> <li>• If done too often, nutrients can build up to toxic levels, which can be harmful to plant roots and soil organisms.</li> <li>• Over-application can cause leaching.</li> <li>• Should do a soil test first to see what nutrients, if any, need to be added.</li> <li>• More expensive than compost (Achievement).</li> </ul>	<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> <li>• Can be difficult to spread and/or dig in.</li> <li>• Unsure of the ratios or type of nutrients it contains, so soil might not be getting the nutrients it needs.</li> <li>• Takes time to make.</li> <li>• Might have to be bought in, at significant cost.</li> <li>• Generally, large volumes are required to supply sufficient nutrients.</li> <li>• Is slow-release (Achievement).</li> </ul>

**Question Two: School garden plot**

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 <b>comparing and contrasting</b> or <b>justifying</b> management practices.	
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.	Fully justifies the method chosen by comparing and contrasting.

N0 = No response; no relevant evidence.

**Examples of evidence for answers**

**Describes** (Achievement) methods that could realistically be used in a school garden plot (Achievement for listing 3 methods or describing 2 methods)

- By hand, using a watering can or hose.
- Sprinklers.
- Irrigation pipes laid along the ground, for drip irrigation or with pop up irrigators.
- Fixed irrigation stands/pipes at ground level or above the gardens on timers.

**Describes** (Achievement)/**Explains** (Merit) how irrigation affects soil properties and how these influence plant growth

- Irrigation increases soil water available to the plant (Achievement), which is required by photosynthesis for improved plant growth (Merit).
- Increased water means that nutrients will be dissolved (Achievement) and readily taken up by the plant, which will improve growth (Merit).
- Water is available for soil organisms (Achievement) which help break down organic matter and make more nutrients available (Merit).
- Water/moist soil encourages worms (Achievement), which improve/help maintain soil structure to provide a good growing environment (Merit) earthworms tunnels improve drainage/aeration and for rootlets to grow down (Merit).
- Water is required during mineral/nutrient uptake (Achievement), because only dissolved minerals/nutrients can be absorbed by the roots (Merit).

**Describes** (Achievement) / **Explains** (Merit) / **Justifies** (Excellence) why raised garden beds are preferable to beds at ground level

<b>Raised beds</b>	<b>Ground-level beds</b>
<p><i>Advantages</i></p> <ul style="list-style-type: none"> <li>• Has better drainage and aeration (Achievement), so plants have better root respiration (Merit).</li> <li>• Less prone to waterlogging (Achievement), meaning that there is less chance of root rot/better root respiration/increase in microbe and earthworm activity.</li> <li>• Soil is warmer/stays warmer longer/heats up faster (Achievement), which increases plant processes (Merit).</li> <li>• Improves the soil/soil selection is more deliberate and it has to be bought in, or, (eg) compost and mulch are contained (Achievement), which improves organic matter, fertility, and water retention (Merit).</li> <li>• The beds/growing areas are contained/separated, so it is easier to do crop rotation (Achievement), because there is less chance of soil-borne pests and diseases moving between beds (Merit).</li> </ul>	<p><i>Advantages</i></p> <ul style="list-style-type: none"> <li>• Not as labour-intensive to set up.</li> <li>• Easier to get machinery into the plot.</li> <li>• Plots are not as exposed to wind, so there is no need for high shelters/fences.</li> <li>• Location of plots can be changed easily.</li> </ul>
<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> <li>• Difficult to get machinery into the plot.</li> <li>• Students may have difficulty reaching all of the plot.</li> <li>• Water can drain out of reach of the roots, because the beds are higher than the natural water table.</li> </ul>	<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> <li>• Cooler soil/can take longer to heat up.</li> <li>• Easier for a pan to form/could cause poor drainage.</li> <li>• Students have to bend over more to work in the plot.</li> </ul>

**Question Three: Farming on clay soil**

Not Achieved		Achievement		Achievement with Merit		Achievement with Excellence	
		<b>Describes</b> how soil management practices are carried out.		<b>Links ideas</b> to <b>explain</b> why soil management practices, or steps within practices, are carried out.		<b>Applies knowledge</b> of soil management practices to given situations. This may involve <b>comparing and contrasting</b> or <b>justifying</b> management practices.	
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.	Fully justifies the method chosen by comparing and contrasting.

**N0** = No response; no relevant evidence.

**Examples of evidence for answers**

**Describes** (Achievement) how lime could be applied

- As a powder / grit that is spread from the back of a mini-spreader or quad bike.
- If on hill country, then it can be applied by an aeroplane / top-dresser.

**Explains** (Merit) the affect lime has on soil properties and how these influence plant growth

- Clay soil is usually acidic, so lime increases the pH, making the soil less acidic (Achievement); this increases the availability of nutrients for plants and improves plant growth (Merit).
- Increased pH / less acidic soil encourages microbes and earthworms (Achievement); these then break down organic matter and make more nutrients available for plant growth (Merit).
- Increased earthworm activity creates tunnels through burrowing (Achievement); this improves drainage and aeration (Achievement), which means more air is available for root respiration (Merit).
- Lime can flocculate clay particles, making the pores larger (Achievement), thereby increasing drainage and aeration (Merit), which helps make the soil warm up faster and speeds up plant root growth / plant processes (Merit).
- Adds calcium (Achievement).

**Describes** (Achievement) / **Explains** (Merit) / **Justifies** (Excellence) why one practice is preferable to the other

Both will improve aeration and drainage, which will reduce waterlogged or saturated soil. Improved aeration will mean the soil warms up faster and root respiration will be increased.

<b>Drainage</b>	<b>Ripper</b>
<p><i>Advantages</i></p> <ul style="list-style-type: none"> <li>• Is a more permanent solution.</li> <li>• Will drain away excess water from the soil (Achievement) which will increase soil air, increasing root respiration and therefore plant growth (Merit).</li> <li>• Improved drainage/less water in the pores (Achievement) means a better environment for soil organisms, and the benefits these bring (Merit).</li> <li>• There is more air/less water in the pore spaces (Achievement), meaning the soil will warm up faster (Merit), which will increase the rate of plant chemical processes and therefore growth (Merit).</li> <li>• Less likely to damage soil structure (Achievement).</li> </ul>	<p><i>Advantages</i></p> <ul style="list-style-type: none"> <li>• Shatters/breaks up the pan so that drainage and aeration is improved (Achievement), which will increase root respiration and plant growth (Merit).</li> <li>• Paddock can then be cultivated to mix in the clay soil (Achievement) and improve soil texture/soil properties (Merit).</li> <li>• Ripper is large and can affect a large area/break a large pan (Achievement), whereas a drainage system will only affect the layer above the drain.</li> <li>• Cheaper than installing drainage.</li> </ul>
<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> <li>• Costly to install.</li> <li>• Needs a larger drain at the end of the paddock for water to drain into.</li> <li>• Installed drain might be below or above the pan, so is not very effective.</li> </ul>	<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> <li>• If not done properly, can lead to worse soil structure (Achievement), and associated problems (Merit).</li> <li>• Can only be a temporary solution if done incorrectly.</li> <li>• May have to repeat or do frequently.</li> </ul>

**Cut Scores**

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