Assessment Schedule – 2025

Agricultural and Horticultural Science: Demonstrate understanding of how soil properties are managed in a primary production system (91930)

Assessment Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding involves describing the primary production system, soil properties and a management practice that modifies soil.	*Explain how soil properties are managed* involves explaining how soil is managed through management practices in a primary production system.	*Evaluate how soil properties are managed* involves evaluating how soil is managed using soil management practice to optimise production.

Evidence

Question ONE	Sample evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	*How is fertiliser applied in your named primary production system?* • Fertiliser can be applied by selecting the type of fertiliser and spreading it evenly over the soil. On a flat / rolling pastoral farm, a tractor may tow a spreader, which spreads granules of fertiliser.	Describes how fertiliser is applied.		
(b)	*Explain how fertiliser impacts soil properties.* • Fertilisers change the chemical properties of the soil by adding more nutrients. • They increase the specific nutrients that make up the fertilisers – for example urea will increase the nitrogen content of the soil but no other nutrients. • They increase the nutrients in proportion to the application rate (kg / ha). • Fertilisers may generally decrease pH of the soil. • Indirectly, fertilisers may change other properties, e.g. if fertilisers increase plant growth, we may see increased organic matter in the soil over time. • Inappropriate fertiliser use may be toxic to life in soil, decreasing those biological properties associated with soil life.	Describes how fertiliser impacts soil properties.	Explains how fertiliser impacts soil properties.	
(c)	*Justify why soil tests should be carried out before applying fertiliser.* • Soil tests provide information about the nutrient status and pH in different areas of the property. Fertilisers can then be chosen to match the chemical properties of the soil, e.g. if sulphur is low in soil, ensure adequate sulphur is in fertiliser. • Soil pH should be between 5.7 and 6.3. When soils are outside this range, plants struggle to take up nutrients, so adding fertiliser will not hugely impact growth.	Describes why soil tests should be carried out.	Explains why soil tests should be carried out, and relates this to use of fertiliser.	Justifies why soil tests should be carried out before applying fertiliser, by giving detailed reasons

	• If too much fertiliser is used, it can cause damage / toxicity to life in soil, reducing the number of organisms in soil. • Plants need adequate levels of nutrients and appropriate pH for optimum growth because they require nutrients for their life processes. Without soil tests, we cannot know which nutrients are required and may provide too many, causing toxicity, or too little, causing deficiencies, and poor plant growth. • Multiple soil tests should be carried out at one time to identify variation in soil properties across a property (depending on the chosen production system). • The cost of soil tests is generally far less than the plant growth benefits of having applied fertiliser correctly.			

N1	N2	A3	A4	M5	M6	E7	E8
Shows minimal understanding of management of soil properties.	Shows limited understanding of management of soil properties.	Demonstrates some understanding of fertiliser.	Demonstrates understanding of fertiliser.	Explains how fertiliser is used to modify soil properties.	Explains in detail how soil tests and fertiliser application are used to modify soil properties with reference to optimised production.	Justifies the use of soil tests and fertiliser application to modify soil properties with reference to production with some reasons.	Competently justifies the usage of soil tests and fertiliser application to modify soil properties with a focus on optimised plant production with sound reasons.

N0 = No response; no relevant evidence.

Question TWO	Sample evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	*Describe how compost is made.* • A variety of plant matter including 'greens' (leafy) and 'browns' (more fibrous / woody) are collected into a container that allows air flow. • The compost is kept moist, so there is air and water. It is mixed regularly and monitored for temperature and pH. • Lime can be used if the compost becomes too acidic. • Once the compost is well decomposed and has become dark humus, it can be added to the soil.	Describes how compost is made.		
(b)	*How can adding compost increase nutrient levels in the soil?* • Compost contains organic matter in a state where nutrients are available for plants to absorb. The amount of each nutrient may vary between different compost mixtures. • Sandy soil can leach nutrients faster than other types of soil, so using compost to supply more nutrients can be beneficial.	Describes how compost increases nutrient levels in the soil.	Explains how compost increases nutrient levels in soil, with reference to biological properties.	
(c)	*Evaluate the application of compost, compared to irrigation and fertiliser application.* • Sandy soils drain water rapidly and leach nutrients out of soil rapidly. • Irrigation replaces soil moisture that is drained away from sandy soil rapidly. Water is required for many plant processes, including photosynthesis. Water is required for micro- and macro-organisms in soil. It is required to dissolve nutrients so plants can absorb them. • Irrigation requires expensive equipment, pumps, a water supply, and labour. It must be used regularly, depending on soil moisture and rainfall. • Long-term, irrigation can decrease the risk of soil reaching wilting point, speed up nutrient leaching (resulting in poor soil fertility), and increase nutrients entering waterways. • Compost replaces nutrients leached from sandy soil. Nutrients are required for many plant processes, e.g. nitrogen is especially important in growing leaves like lettuces. • Compost can be expensive to make or purchase, and application requires special equipment, depending on the size of the farm. • Compost is generally used less often than irrigation, so less testing and labour is required. • Long-term, compost can reduce soil pH, maintain optimum soil nutrient levels, and increase nutrient leaching into waterways.	Describes how compost differs from fertiliser and irrigation.	Explains how management practices improve soil properties.	Evaluates the use of compost by comparing it to irrigation and fertiliser application. Includes long-term effects on soil and production.

	• A production system without irrigation risks large scale plant death if the sandy soil reaches permanent wilting point. • A production system without compost risks slow growth as it becomes low in nutrients. The grower does have other options to replace nutrients, like fertiliser.			

N1	N2	A3	A4	M5	M6	E7	E8
Shows minimal understanding of management of soil properties.	Shows limited understanding of management of soil properties.	Demonstrates some understanding of management of a soil property using the chosen management practice.	Demonstrates understanding of management of compost.	Explains how a named management practice is used to modify soil properties.	Explains in detail how two named soil management practices are used to modify soil properties, leading to optimised production.	Evaluates the usage of compost, as opposed to irrigation and fertiliser application to modify soil properties, with a focus on optimised production.	Fully evaluates the usage of compost, as opposed to irrigation and fertiliser application, to modify soil properties, with a focus on optimised production.

N0 = No response; no relevant evidence.

Question THREE	Sample evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	*Describe how a chosen management practice is carried out.* **Example – installing a drainage system** • Mole drainage is carried out by pulling a bullet-shaped mole plough behind a tractor in lines, which point towards a low point in the paddock. • Mole drainage may need to be repeated every few years.	Describes how one listed management practice is performed.		
(b)	*How does this management practice improve one physical and one biological property of the soil?* **Physical property** • Drainage can increase the aeration of soil because there is less water in the soil pores, which can then be replaced by air. **Biological property** • Drainage can increase decomposition in the soil because having a better balance of air and water is needed for microorganisms and macroorganisms.	Describes how a management practice impacts physical OR biological properties.	Explains how a management practices impacts physical AND biological properties.	
(c)	*Of your two practices, which management practise is more effective in improving soil structure and drainage in your chosen primary production system?* **Example – application of lime** • Lime has the effect of flocculation on clay particles. This is where clay particles clump together more, leading to more peds and more larger pores between peds. These macropores allow water to drain better and allow more plant growth, which can lead to even better soil structure. • Unfortunately, the flocculation by lime is useful only for clay particles and is a less effective tool for draining water compared to using mole drainage.	Describes a second management practice and its impact on soil properties.	Explains how a management practice has a greater impact on soil properties.	Justifies why a named management practice is more effective, with reference to optimised production.

N1	N2	A3	A4	M5	M6	E7	E8
Shows minimal understanding of management of soil properties.	Shows limited understanding of management of soil properties.	Demonstrates some understanding of management of soil properties using the chosen management practice.	Demonstrates understanding of management of soil properties using the chosen management practice.	Explains how a soil management practice is used to modify soil properties.	Explains in detail how a soil management practice is used to modify soil properties leading to optimised production.	Justifies why the grower should use one management practice over the alternative using an understanding of how the management practices modify soil properties, with a focus on optimised production.	Competently justifies why the grower should use one management practice over the alternative using an understanding of how the management practices modify soil properties, with a focus on optimised production.

N0 = No response; no relevant evidence.

Marking Māori concepts:

Where the candidate has not referred to, or inferred, information about a relevant Māori concept at all across their whole submission, that candidate may not be awarded a passing grade.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0–7	8–12	13–18	19–24