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91930



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Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Agricultural and Horticultural Science 2024

91930 Demonstrate understanding of how soil properties are managed in a primary production system

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of how soil properties are managed in a primary production system.	Explain how soil properties are managed in a primary production system.	Evaluate how soil properties are managed in a primary production system.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–11 in the correct order and that none of these pages is blank.

Do not write in the margins (// // // //). This area will be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Achievement

TOTAL 10

INSTRUCTIONS

You must choose a **different** soil management practice to answer each question.

Ensure reference to a **relevant** Māori concept or value, related to soil management, is included in your response. One or more concepts may be appropriate.

Note: 'Soil properties' refers to physical, chemical, and biological aspects of soil.

QUESTION ONE: Soil water

Choose a primary production system.

Primary production system:

Dairy farming

- (a) (i) Name and describe a soil type that would require management to remove excess water during periods of high rainfall.

Clay-like Soils with lesser drainage spaces are more prone to becoming flooded during rainfall. The texture and properties of Clay like Soils makes Compaction and Flooding easier as of Build up's.

- (ii) What impact can excess water have on soil properties and plant growth?

Excess water ~~can~~ added to Soils can decrease its growth properties and fertility rates by over-flooding the Soil.

The build up of Soil and Compaction can cause a layer underneath the top Soil that is Compacted and won't allow growth of roots to thrive and access/get past this point.

Also the add up of pugging from livestock treading in wet areas can make the Soil hard for growth and accessibility.

The flooding and excess water provides an inability for plants to thrive, especially if growth is already there, thus causing the plants/crop to wilt and become over-hydrated. (Basically drowning them)

- (b) Evaluate a soil management practice that is used to remove excess water from a soil in your chosen primary production system.

In your answer, you should consider how the management practice:

- modifies conditions for plant growth and productivity
- improves soil conditions
- cares for the soil.

The most common reliable method for removing the excess water from your land/crop is ~~installing~~ installing Nova-flo, which is a plastic drainage pipe that gets installed underneath the ground to remove the excess water. The pipe has little holes along it to allow entrance for the water.

There are other methods/options such as ~~installing~~ installing clay-brick like pipes that also contribute to drainage in a similar way that Nova-flo does but Nova-flo is proven to be more cost effective.

Installing Nova-flo thus helps the improvement of the soil qualities, allowing better access for root systems to thrive and less build up and compaction within the base of the soil.

Drainage systems for soils are almost vital for proper plant growth, removing the excess water helps not only the plants to get all the space and the right amount of hydration they need to thrive but it thoroughly helps the soil's qualities, allowing it to be better for years to come.

Including Manaakitanga into the equation, using these management practices such as installing

Nava-flo and drainage access helps the Soil not only for Current plant usage but it helps keep the Soil healthy and at a perfect rate for the future generations or just future usage in general.

QUESTION TWO: Soil nutrients

Choose the same or a different primary production system to answer this question.

Primary production system:

Dairy farming

- (a) How are nutrient levels tested in soil in your chosen primary production system?

Nutrient levels within soils are usually rated along the pH scale for levels of acidity. The average and main level you want your soils to be at is between 6.5-7 on the pH scale. That's how you should know that your soil is at a good nutrient intake and isn't at high levels of acidity.

- (b) Evaluate a soil management practice for your chosen primary production system that can increase the level of nutrients in the soil. This practice must be **different** from the one discussed in Question One.

In your answer, you should consider how the management practice:

- alters the properties of soil
- cares for the soil
- helps optimise plant growth.

Fertilising is a main method of controlling and improving your soils nutrient intake. Adding certain fertilizers can help improve certain properties within your soil. ~~Add~~ It is usually recommended to add the certain fertilizers which include and provides the properties in which your soil lacks. Adding the fertilizers onto the soils can be carried out by trucks, tractors or even planes to help spread

the fertilizers evenly overtop of your Soils. Sometimes it tends to depend on the type of fertilizer your using whether its very cost effective or not. If the material used to fertilize Soil is rare and harder to access then you will find it being more on the expensive side, Costing you a greater deal to look after your Soils.

But at the end of the day carrying out the management practice of fertilizing is worth the money. Manaakitanga also comes into this concept helping care and improve the qualities and properties of the Soil to make it easier for generations to come when it comes to managing ~~any~~ and looking after the land.

QUESTION THREE: Soil organisms

Choose the same or a different primary production system to answer this question.

Primary production system:

Dairy farming

- (a) What benefits do living organisms have on soil properties and plant growth in your chosen primary production system?

living organisms in the soil such as bugs, worms and other small organisms have a positive affect on the health of the soil. them inhabiting the soil and consuming matter within the soil helps improve the soils nutrients and minerals. The organisms digesting and letting out the matter consumed helps add to the soil, including many more nutrient factors to it.

- (b) Evaluate how a soil management practice for your chosen primary production system can modify soil conditions to promote living organisms. This practice must be **different** from ones discussed in questions One and Two.

In your answer, you should consider how the management practice:

- improves the overall health of the soil
- helps optimise plant production.

The increasage of things such as minerals helps add to the organisms ~~the~~ diet and such. Increasing these factors helps the organisms better thrive within their ~~the~~ habitat, the soil.

The acidity levels within the soil also can play a big part in the organisms health and being able to provide for the qualities of the soils. Practices such as liming

Can help decrease the acidity levels, making it more inhabitable for the organisms.

Liming can be carried out by adding lime which is discarded sea matter, such as crustaceans, fish bones, shells and sand. Adding lime continues to bring down the acidity levels on the pH scale which should be around 6.5-7.

Carrying out practices such as these help with the thriving of organisms allowing them to grow and reproduce. The concept of Manaakitanga can also be brought into this allowing the organisms to carry on thriving and doing their thing within the soil, keeping it healthy for the future generations to look after the land.

Achievement

Subject: Agricultural and Horticultural Science

Standard: 91930

Total score: 10

Q	Grade score	Marker commentary
One	A3	The candidate has shown an understanding that clay soils had more water and are therefore more likely to need management to remove excess water. They have described that water can cause pugging from livestock, and excess water will mean the plants cannot grow. They have described the used of Novaflo and clay tiles as ways to removed excess water. The candidate has discussed how drainage shows Manaakitanga towards the soil. For a more solid achieved the candidate would have linked excess water to reduced soil aeration.
Two	A3	The candidate has shown an understanding that fertiliser will increase the nutrient status of the soil. They understand that producers add fertiliser to provide the nutrients that the soil is lacking in. The candidate has discussed how fertiliser shows Manaakitanga towards the soil, meaning it can provide for future generations. For a more solid Achieved the candidate would have described how increased nutrients in the soil would increase plant growth.
Three	A4	The candidate has shown an understanding that living organisms are important in the soil, focusing on the releasing of nutrients from organic matter. They have described that applying lime to the soil reduces the acidity levels, making a more habitable environment for soil organism, allowing them to thrive, grow and reproduce. The candidate has discussed how liming shows Manaakitanga towards the soil organism. For a Merit the candidate will have explained the importance of soil organisms, linking the nutrients they release to plant growth, and also explained other benefits, e.g. aeration leading to increased respiration.