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91290



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Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Agricultural and Horticultural Science 2025

91290 Demonstrate understanding of techniques used to modify physical factors of the environment for NZ plant production

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of techniques used to modify physical factors of the environment for commercial plant production in New Zealand.	Demonstrate in-depth understanding of techniques used to modify physical factors of the environment for commercial plant production in New Zealand.	Demonstrate comprehensive understanding of techniques used to modify physical factors of the environment for commercial plant production in New Zealand.

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 2–8 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

QUESTION ONE: Light

Identify a plant production type and management practice of modifying light.

Plant production type: Greenhouse tomatoes

Light modification management practice: Shade cloth

- (a) Describe how your chosen management practice modifies the physical factor of light, and explain how this affects plant growth.

Shade cloth can come in various shade percentages based off what you need. For a greenhouse shade cloth can be put on the outer or inner side by using zip ties. The shade cloth has holes ~~through~~ through-out the cloth to still continue to let light in. The cloth helps reduce intense light rays from shining directly on to plant leaves. This helps the plant not get leaf burn while still providing correct light and temperature amounts. The plant can still use the light for photosynthesis and carry out the life cycles used for growth.

- (b) Compare the use of your chosen management practice over not using it. Consider this in terms of improvement in both **quality** and **crop yield**.

Not using shade cloth on tomato plants can increase the risk of leaf burn and possibly even flower production. Flower growth is important for crop yield as that is how fruit starts out. Leaf burn can affect quantity and quality as the plant starts using its energy and resources on repairing leaves, instead of good nutrients going to fruit. Shade cloth can also help prevent burn on the tomato fruit itself.

QUESTION TWO: Irrigation

Choose a method of irrigation.

Irrigation method: ~~K/H/W/E~~ Sprinklers

- (a) Explain how this method modifies physical factors of the environment and impacts pasture production.

Sprinklers can either be propped up onto a wooden post or connected to a moveable water pipe. This irrigation method allows the pasture to absorb the water slowly due to the sprinklers water droplets being small and gentle. If it was not as gentle and small such as a irrigation system that uses a power ~~hose~~ hose, ponding will occur which pushes out nutrients, also known as leaching. This helps pasture get the water they need during dry times to benefit the production. Before irrigation you need to check and test the water supply for its nutrients.

- (b) Justify a farmer's decision to irrigate their farm using your chosen method, taking into account the **environmental** and **economic** impacts of this practice.

Economically it is not the most expensive option, to set up. But the water running costs depending on your areas heat / rain fall levels, running water can be very costly. Moving these sprinklers can be labour intensive and cost ~~the~~ the farmer more money if broken in moving, like pipes being bent, sprinklers being dragged and snapped broken.

The environment will flood less because the sprinklers apply water gently. Allowing the soil to ~~to~~ absorb and keep up with the amount being irrigated. This helps support pasture growth by preventing ponding and pushing out the oxygen in the soil, if there is ponding ~~water~~ soil can become water logged, increasing weeds, diseases, pests, and root rot.

QUESTION THREE: Temperature

Identify a production type and a management practice that could be used to modify temperature in horticultural production.

Horticultural production type: Tomatoes in glasshouse

Temperature management practice: Heaters

- (a) (i) Describe how the use of your chosen management practice modifies the temperature of the physical environment for your chosen horticultural production type.

The heater inside a glass house helps keep temperature up during cold nights and seasons, by burning gas and releasing warmer air into the glasshouse keeping the place warmer for plants to continue life cycles even when out of season.

- (ii) Explain how modifying the temperature improves plant growth.

plant growth is increased by keeping the plant at its optimal temperature so that the plants cycles can continue. All plants have different wants and needs. So keeping the temperature at the optimal temp helps growth not decrease.

- (b) Justify how the use of this management practice impacts the **timing** of harvest and the **economic** returns for the grower.

This management practice helps the grower economically by growing and selling the tomatoes when they are out of season. When they are in high demand going for more price. The heater helps trick the plants in the glasshouse that it is still the warmer months, so it continues to grow and develop fruit until it is ready to sell.

Extra space if required.
Write the question number(s) if applicable.

QUESTION
NUMBER

91290

Achievement

Subject: Agricultural and Horticultural Science

Standard: 91290

Total score: 10

Q	Grade score	Marker commentary
One	A3	The candidate has described how the management practice is carried out and how it alters the amount of light. There is insufficient links or reference to growth.
Two	A3	The candidate has included a brief description of what sprinklers are, and how they add water to pasture. Limited reference to plant processes is included – especially transpiration and photosynthesis – and how water improves / is needed for pasture growth.
Three	A4	The candidate has described heating in terms of greenhouses, and how they alter the temperature. Brief reference has been made to plant growth and the impact on the tomato growing season.