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NZQA

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Agricultural and Horticultural Science 2023

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 2–12 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (DO NOT WRITE IN THIS AREA). 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.

Merit

TOTAL 15

QUESTION ONE: Greenhouses

Source: https://www.tomatoesnz.co.nz/assets/Uploads/EJJ9595.jpg

(a) How do commercial greenhouses allow the grower to modify TWO physical factors to improve crop production?

Physical factor (1): ~~CO2~~ reflective ~~[illegible]~~ mulch

The photosynthesis ~~equation~~ is ~~carbon dioxide + water~~ light chloroplasts ~~glucose + oxygen~~

~~Using~~ using reflective mulch ~~[illegible]~~ on the ground ensures the maximum absorbtion of light. The mulch on the ground reflects the light that missed the plants the first time back up to the ~~[illegible]~~ plants to use for photosynthesis to create sugar to grow. Increased light means more photosynthesis to grow, improving crop production.

Physical factor (2): light

Greenhouse can have diffused windows to block some light to make sure plants get enough light without getting burnt. The light energy can turn into heat energy to ~~the~~ speed up the enzymes in the plant increasing the rate of photosynthesis, increasing growth which improves crop production.

(b) Justify the use of greenhouses for a commercial crop in terms of crop yield and timing. In your answer consider the economic and environmental impacts.

Using reflective mulch ensures that the plants get as much light as possible without missing any this increases the ~~Rate~~ of photosynthesis producing more sugars to grow faster this can allow the grower to produce more crop yeild and faster increasing profit. Mulch isnt that costly and isnt bad for the enviroment so it is an ethical investment and improves growers profit by allowing them to grow and sell crops quicker.

QUESTION TWO: Irrigation systems

Source: https://www.kirkirrigation.co.nz/k-line

(a) How can irrigation systems modify TWO aspects of the growing environment for commercial plant production?

Aspect (1): Water reaches everywhere.

Sometimes rain is unable to make it to certain parts of the land because wind can blow it or trees can block it. Irrigators are just strong enough to withstand wind but can also shoot to far off distances making sure it gets to the soil for plant use.

Aspect (2): Water in Dry spells.

in times like Summer where there is little to no rain irragators are helpfil to ensure plants have water to carry out photosynthesis to make sugar to grow.

(b) Justify the use of an irrigation system in a commercial crop in terms of crop yield and quality. In your answer consider the environmental and social impacts.

Irrigation Systems can replace rain which will be perfect for times with no rain like summer this will result in more crop yeild and would make it possible to grow more crops in Summer resulting in more profit. Irrigation Systems also can be lighter on plants then rain which reduces damage to the plant and increases quality. and also allows for water to go every where in the soil. Irrigation Systems can also be set on timers to suit plants water needs to make sure plants have enough water to carry out photosynthesis and grow which results in good quality crops as well as increased crop yeilds therefore leading to more profit. This could lead to people being mad as some irrigation systems use water from rivers to water crops and people use this water without permission resulting in people not being happy about that.

QUESTION THREE: Light

Source: https://www.hortnz.co.nz/

(a) How are TWO management practices used to modify access to light in outdoor plant production?

Management practice (1): Crop row orientation

planting crops from north to south allows an even amount of sunlight on both side of the plant. This ensures plants get as much sunlight as possible to carry out photosynthesis to create sugars to grow.

Management practice (2): Crop Spacing.

By spacing out the crops, this allows for more plants to get sunlight to carry out photosynthesis, no plants will have to compete for light because they wont be growing over eachother.

(b) Justify the use of one of these management practices in terms of crop quality and timing. In your answer consider the economic and social impacts.

Crop Spacing allows for plants to be absorbing as much light as possible to carry out photosynthesis to create sugars to grow this ensures that the plants can grow to there fullest potential and do it at a faster pace because they will have access to more light. This will ensure fruit will have the sugars it needs to grows which will result in more crop yeild meaning more profit for the grower. People might not be happy about the fact that the crops would need to take up more land to be able to space them out however

It will allow more room for workers making it easy for them.

Merit

Subject: Agricultural and Horticultural Science

Standard: 91290

Total score: 15

Q	Grade score	Marker commentary
One	M5	The candidate used the physical factor of light in their discussion. They discussed light improvement using two different methods, reflective mulch and diffused windows. There was further explanation of the increase in crop production by the improvement of plant processes, which improved the amount of glucose produced. Discussion was also given about improved timing to harvest.
Two	M5	The candidate explained how water increases photosynthesis, which increases sugar production and therefore plant growth. They discussed how irrigation is helpful to plant growth during dry weather.
Three	M5	The candidate chose two good management practices to improve the light levels in a crop. A deeper explanation about how the plant receives more light with row orientation would have been beneficial.