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90451

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 2 Agricultural and Horticultural Science, 2005

90451 Describe physical factors of the environment and techniques used to modify them for plant production

Credits: Four
9.30 am Monday 21 November 2005

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 answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

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

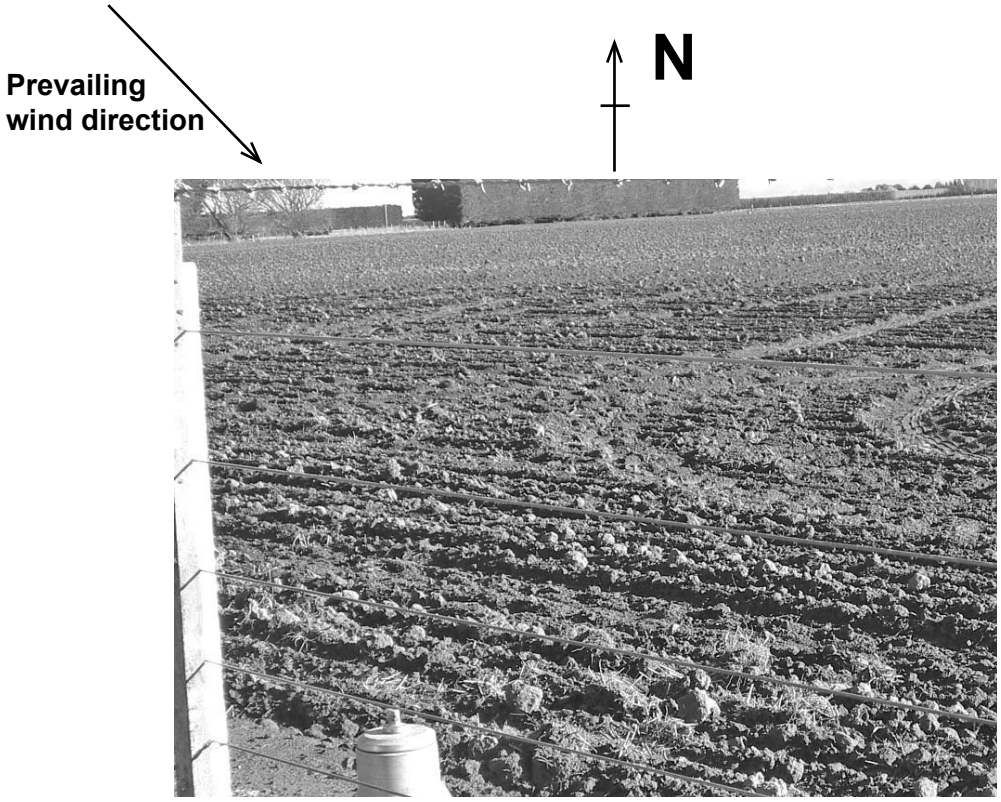
For Assessor's use only	**Achievement Criteria**				
Achievement		**Achievement with Merit**		**Achievement with Excellence**	
Describe physical factors of the environment that affect plant production.	☐	Explain how physical factors of the environment affect plant production.	☐	Explain how physical factors of the environment affect plant production.	☐
Describe techniques used to modify physical factors of the environment for plant production.	☐	Explain how techniques used to modify physical factors of the environment improve plant production.	☐	Justify techniques used to modify physical factors of the environment for plant production.	☐
Overall Level of Performance (all criteria within a column are met)					☐

You are advised to spend 40 minutes answering the questions in this booklet.

Mr and Mrs Smith have the option of growing a vining pea crop under contract to a processing company. Vining peas are 'garden' peas that are processed into frozen or canned products for human consumption. The contract states that the crop must:

- yield over 2 tonnes / ha
- be of high quality as measured by uniform medium pea size, maturity and tenderness
- be harvested on, or about, 31 December to meet processing schedules.

The Smith's are considering the suitability of a 4 ha paddock with a sandy loam soil type and pH of 5.8 for growing the pea crop. A photograph of the paddock is shown below.



The property is exposed to dry nor'westerly winds during the late-spring period, with wind speed of 25 km/h and at least three days with gusts over 62 km/h.

This working space is available for your analysis of the data on page 3:

Mean climatic data for the property are given in Resource One below.

Resource One

[For copyright reasons, this resource cannot be reproduced here. See below.]

The grower has identified factors that influence pea production. These factors are outlined in Resource Two.

Resource Two

[For copyright reasons, this resource cannot be reproduced here. See below.]

Source for both resources: Euan Wallace, *Vegetable Growers Handbook 2000*, (Havelock North: Agro-Research).

QUESTION ONE

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Use the information given on page 2, and in the resources on page 3, to determine the suitability of the physical factors of the Smith's property for producing a high-yielding, high-quality pea crop. A high-quality pea crop is one where the peas are of uniform size, maturity and tenderness.

(a) Describe, and explain, how TWO physical factors of the property are **desirable** for the production of a high-yielding, high-quality pea crop.

Desirable physical factor (1): _____

Description of desirable physical factor	Explanation of how this physical factor **improves** the production of a high-yielding, high-quality pea crop

Desirable physical factor (2): _____

Description of desirable physical factor	Explanation of how this physical factor **improves** the production of a high-yielding, high-quality pea crop

(b) Describe, and explain, how TWO **other** physical factors of the property may **limit** the production of a high-yielding, high-quality pea crop.

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Limiting physical factor (1): _____

Description of limiting physical factor	Explanation of how this physical factor may **limit** the production of a high-yielding, high-quality pea crop

Limiting physical factor (2): _____

Description of limiting physical factor	Explanation of how this physical factor may **limit** the production of a high-yielding, high-quality pea crop

QUESTION TWO

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For each of the TWO physical factors identified in Question One (b) that could be a **limiting factor** for the production of a pea crop:

(a) Describe a technique that could be used to change the physical factor so that it is more favourable for the production of a high-yielding, high-quality pea crop.

(b) Explain how using the technique improves the production of a high-yielding, high-quality pea crop.

Limiting physical factor (1): _____

Description of technique used to change this limiting physical factor	Explanation of how this technique improves the production of a high-yielding, high-quality pea crop

Limiting physical factor (2): _____

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Description of technique used to change this limiting physical factor	Explanation of how this technique improves the production of a high-yielding, high-quality pea crop

QUESTION THREE

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Mr and Mrs Smith also produce potatoes for a market that pays high prices for 'new' potatoes during a 2-week period beginning 1 December.

In a normal growing season, the 'new' potato market's requirements for quantity and small uniform size can be achieved by planting seed potatoes on 1 September.

Snow on the mountains indicates that frosts could occur in mid-September, and this is a major concern to the Smiths. They are considering the following techniques to prevent frost and maximise financial returns from a 0.5 ha crop.

Technique A – Plant seed potatoes on 14 September, cover the seedbed with black plastic sheeting and remove the sheeting when the plants emerge.

Technique B – Plant seed potatoes on 1 September and install a wind machine to prevent frost.

Technique C – Plant seed potatoes on 1 September on fertile land located on a nearby north-facing hillside.

Select the technique you consider would maximise the **financial returns** to the grower.

Selected technique: _____ (use letter)

Justify your selected technique by explaining why its use would be more likely to maximise the **financial returns** than the other two techniques.

Extra paper for continuation of answers if required.
Clearly number the question.

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Question number	

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Clearly number the question.

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Question number	