



Western Australian Certificate of Education Examination, 2010

Question/Answer Booklet

PLANT PRODUCTION SYSTEMS

Stage 3

Please place your student identification label in this box

Student Number: In figures

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In words

Time allowed for this paper

Reading time before commencing work: ten minutes
Working time for paper: three hours

Materials required/recommended for this paper

To be provided by the supervisor

This Question/Answer Booklet
Multiple-choice Answer Sheet

To be provided by the candidate

Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special items: non-programmable calculators satisfying the conditions set by the Curriculum Council for this course

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of exam
Section One: Multiple-choice	15	15	20	15	15
Section Two: Short answer	8	8	90	96	50
Section Three: Production practices	1	1	30	30	15
Section Four: Extended answer	3	2	40	40	20
Total					100

Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010*. Sitting this examination implies that you agree to abide by these rules.
- Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two, Three and Four: Write answers in this Question/Answer Booklet.

- You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
- Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
 - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
 - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

See next page

Section One: Multiple-choice

15% (15 Marks)

This section has **15** questions. Answer **all** questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 20 minutes.

1. When there is a lack of readily available soil water, plants
 - (a) increase respiration.
 - (b) increase root pressure.
 - (c) close their stomata.
 - (d) decrease osmotic pressures.

2. Unless management intervenes, soil erosion is part of a vicious feedback cycle because
 - (a) profitability decreases.
 - (b) there is a failure in stewardship.
 - (c) it starts with a small beginning.
 - (d) the bigger it gets the faster it gets bigger.

3. The importance of the photolysis of water by plants is to
 - (a) avoid water stress.
 - (b) sustain autotrophs.
 - (c) fix carbon dioxide.
 - (d) enable photosynthesis.

4. Synthetic auxins are used in plant production to improve
 - (a) selective weed control.
 - (b) water use efficiency.
 - (b) fruit colour.
 - (d) net photosynthesis.

5. Yesterday's level of water in the root zone was 50 mm and since then there has been 10 mm of evapotranspiration, 15 mm of precipitation and 5 mm of drainage below the root system. The new level of soil water in the root zone is
 - (a) 20mm.
 - (b) 50mm.
 - (b) 40mm.
 - (d) 30mm.

6. It is professional behaviour to be sceptical about results of a field experiment, unless
- (a) the experiment was repeated in several locations.
 - (b) there was randomisation and replication.
 - (c) they have been peer reviewed.
 - (d) there is statistical difference at the 5% level of probability.
7. Managers exercise financial control by monitoring
- (a) gross margins.
 - (b) profits and losses.
 - (c) cash flows.
 - (d) available credit.
8. An acidic soil has
- (a) low concentrations of hydrogen ions in the root zone.
 - (b) toxic concentrations of aluminium.
 - (c) a long cropping history.
 - (d) toxic concentrations of hydrogen ions.
9. The main benefit of respiration by a plant is to provide energy for
- (a) photosynthesis.
 - (b) transpiration.
 - (c) temperature regulation.
 - (d) growth and development.
10. Theoretically, rates of fertiliser applications need to match soil types and
- (a) rates of growth.
 - (b) crop establishment.
 - (c) cropping history.
 - (d) biological yield.
11. In pest management the economic threshold is the level of pest that
- (a) causes economic loss.
 - (b) causes diminishing returns.
 - (c) triggers action for an economic benefit.
 - (d) triggers an outbreak.
12. Dormancy in the life cycles of pests, diseases and weeds makes their management in production systems more difficult because
- (a) they cannot be treated before they become active.
 - (b) it makes them more persistent.
 - (c) it makes them more likely to develop pesticide resistance.
 - (d) they can become active before the cropping season.

13. Producers of plant products in Australia can be price-takers rather than price-makers because
- (a) markets are perfect.
 - (b) they compete in centralised markets.
 - (c) they are unable to dominate the markets.
 - (d) restrictive trade practices operate.
14. The most rapid movement of nutrients to the root surface is by
- (a) desorption from the cation exchange sites.
 - (b) the transpiration stream.
 - (c) osmosis.
 - (d) flow of the soil solution.
15. Soil chemical tests for the estimation of fertiliser needs are based upon
- (a) chemical extractants.
 - (b) fertiliser history.
 - (c) leaf tissues.
 - (d) visual leaf symptoms.

End of Section One

Section Two: Short answer**50% (96 Marks)**

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the spaces provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

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Suggested working time: 90 minutes.

Question 16**(12 marks)**

The area affected by dryland salinity is increasing in Western Australia.

- (a) Explain, using **two** specific examples, how farming practices have contributed to the expansion of cropping land affected by dryland salinity. (4 marks)

(b) Explain **two** ways in which saline soils can interfere with crop growth and farming activities.

(4 marks)

(c) Describe **two** methods that farmers can use to reverse the encroachment of dryland salinity.

(4 marks)

Question 17

(12 marks)

Managing soil water in agricultural systems is difficult in Western Australia.

- (a) List **two** factors that determine the amount of water that can be held in a soil. (4 marks)

- (b) Describe **two** actions that land managers can take to manage the amount of water held in the soil. (4 marks)

- (c) Describe **two** properties of waterlogged soils and the effects of these properties on plant growth. (4 marks)

Question 18

(12 marks)

Consumers are concerned about the origins of their food and the methods used in intensive crop production. These concerns have created an increasing demand for certified organically produced food.

- (a) Outline **three** examples that illustrate the differences in production methods between organically grown and intensive systems. (6 marks)

- (b) Use an example to describe how an organic farmer could manage plant nutrition. (3 marks)

- (c) Use an example to explain how a consumer could be assured that organically grown food was truly organic. (3 marks)

Question 19

(12 marks)

Sustainable crop production aims to produce food and fibre while maintaining the 'triple bottom line' of economic, environmental and social objectives.

- (a) Outline a specific economic objective. (3 marks)

- (b) Outline a specific environmental objective. (3 marks)

(c) Outline a specific social objective. (3 marks)

(d) Provide an example of the kinds of difficulty a farmer can face when trying to satisfy the combined requirements of the economic, environmental and social objectives. (3 marks)

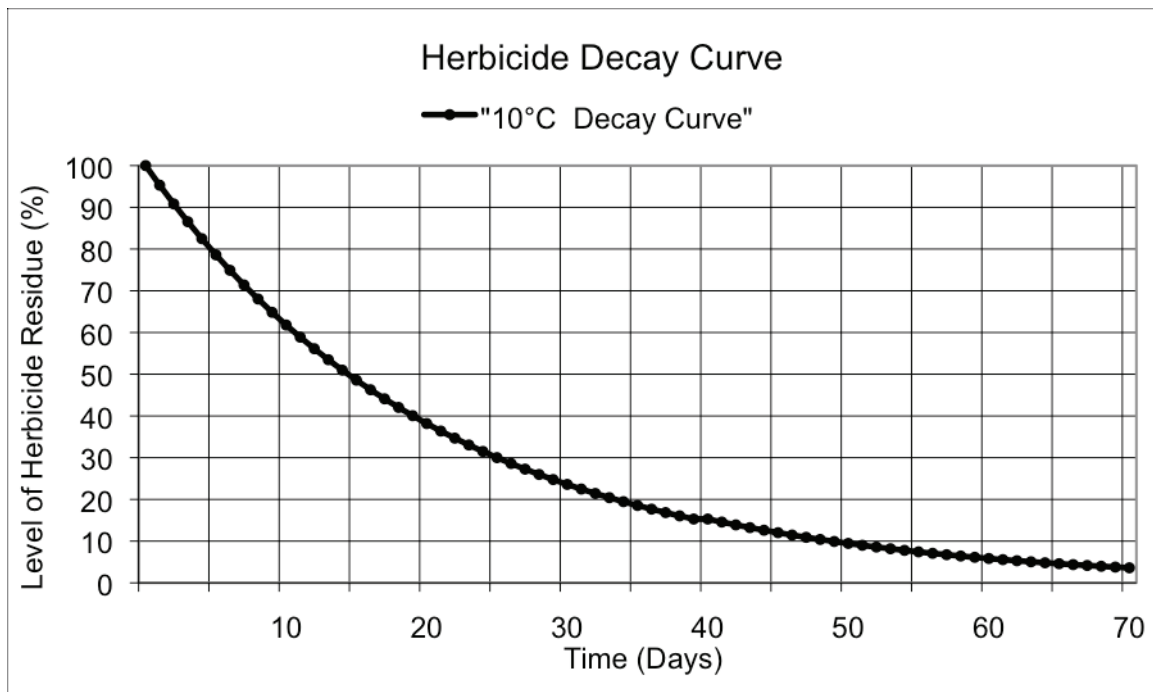
Question 20

(12 marks)

Weeds in a crop can be selectively controlled with a particular herbicide if it is applied at 100 g/ha to the soil when the crop is sown.

The herbicide is broken down by soil microbes and is, consequently, more persistent at low soil temperatures.

The graph below shows the decay-curve for the herbicide at 10°C when it was applied at 100 g/ha (100% on the vertical scale).



- (a) Use the graph above to estimate the level of residue in the soil at 10°C after a time of three half-lives. (1 mark)

The level of residue is: _____

- (b) The herbicide has a half-life of 5 days at 20°C. On the graph above, draw a decay-curve for the herbicide if it has been in soil at 20°C since it was applied. (3 marks)

(c) Given the following:

- cold conditions (i.e. 10°C) persist for 35 days after the herbicide has been applied
- under cold conditions, weeds can continue to emerge in the crop during its establishment
- the threshold for effective weed control with the herbicide is a residue level of 30 g/ha
- the farmer monitors the crop for weeds and will apply further treatments if considered necessary

Describe **two** likely observations the farmer will make when monitoring the weeds and, in general terms, suggest **two** actions that may be necessary should the weeds reach economic injury levels. (4 marks)

(d) Describe **four** methods that can be used to minimise the risk of damage by the herbicide to the natural environment. (4 marks)

Question 21

(12 marks)

There is much said in the media about the role that carbon dioxide plays in global warming and the changes that will impact on society and agriculture.

- (a) Identify and explain **two** cropping practices that can contribute to global warming. (4 marks)

- (b) Describe **two** changes that could be made to the methods of crop production in Western Australia to overcome the effects of global warming. (4 marks)

- (c) Explain 'carbon trading' and give **one** way that farmers could derive a benefit from it. (4 marks)

Question 22

(12 marks)

Managers of plant production enterprises need to minimise risks to profitability and damage to the natural environment. These risks vary in the level of the consequences and the probability of occurrence.

- (a) Explain the meaning of 'probability of an event'. (2 marks)

- (i) Describe an event that can be highly probable. (2 marks)

- (ii) Describe a strategy to decrease the probability of the event described in (a)(i). (2 marks)

(b) Explain the meaning of 'consequence of an event'.

(2 marks)

(i) Describe an event that can have a high consequence.

(2 marks)

(ii) Describe a strategy to decrease the consequence of the event.

(2 marks)

- (c) Explain how an IPM program can help to avoid an increase in new pest species that are more difficult to control with available methods. (3 marks)

End of Section Two

Section Three: Production practices

15% (30 Marks)

This section contains **one (1)** question. You must answer this question. Write your answers in the spaces provided.

Use a plant production enterprise in which you participated during your course this year to answer the following parts of question 24.

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Suggested working time: 30 minutes.

Question 24

(30 marks)

Managers plan, execute and monitor many activities to achieve the following general objectives:

- profitable production over the long term
- maintain and improve natural resources.

(a) Name the plant production enterprise and list its marketable products. (2 marks)

(b) In the table below, list **five** practices used in the production enterprise and next to each outline a potential impact that the practice could have on the environment. (5 marks)

Production practice	Potential environmental impact

See next page

(c) Using one of the production practices that you have identified in part (b), answer the following:

(i) Describe in detail, **one** specific impact that the practice has on the environment. (3 marks)

(ii) Describe **one** action that land managers could use to overcome the impact of the practice. (3 marks)

- (iii) State a key performance indicator (KPI) you would use to monitor the effectiveness of the action described in (c)(ii) and outline **four** steps you would follow in its use. (4 marks)

- (d) In the table below, outline **three** factors that can impact on the profitability of the enterprise. (3 marks)

Factors affecting profitability

(e) Using one of the factors that you have identified in part (d), answer the following:

(i) Describe in detail the economic factor and how it impacts on the profitability of your enterprise. (3 marks)

(ii) Describe **one** action that could be used to enhance the profitability of the enterprise. (3 marks)

(iii) State a key performance indicator (KPI) you would use to monitor the effectiveness of the action described in (e)(ii) and outline **four** steps you would follow in its use. (4 marks)

End of Section Three

See next page

Section Four: Extended answer

20% (40 Marks)

This section contains **three (3)** questions. You must answer **two (2)** questions. Write your answers in the spaces provided.

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Suggested working time: 40 minutes.

Question 25

(20 marks)

Farmers need to ensure that their activities maintain and improve the natural resources of their farms.

- (a) Explain how plant production systems can lead to nutrient pollution of waterways and describe the environmental conditions that can contribute to the problem. (8 marks)

Question 26

(20 marks)

Managers of plant production systems aim to control some of the factors that determine maximum yields and the quality of the end product.

- (a) Outline a specific production environment and describe the characteristics you would look for in selecting a suitable cultivar. (8 marks)

(b) Describe how a plant breeder would go about developing a new cultivar that would be suited to the environment described in part (a). (6 marks)

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