Candidate Number: ……..

Candidate Name: …….

Centre Number/Name: ……

RHS LEVEL 3 DIPLOMA IN HORTICULTURE
WRITTEN EXAMINATION

Thursday 10 February 2005

IMPORTANT – Please read carefully before commencing.

i) The duration of the papers in Module **G** is **2 hours**.
ii) Answer **ALL** questions in Section **A**.
iii) **ALL** questions in Section **A** carry equal marks.
iv) Write your answers legibly in the spaces provided.
v) Use metric measurements only.
vi) Where plant names are required they should include genus, species and where appropriate, cultivar.

Module G

Genetics and Plant Breeding
Physiology of Flowering, Reproduction and Development

Section A - Short Answer Questions

Please turn over/……

Answer All questions

Marks

Q1 Name **FOUR** morphological plant characteristics which may be used in plant identification. **2**

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Q2 Describe the structure and function of **EACH** of the following:

i) mitochondria;

ii) nucleolus. **2**

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Q3 Define the term 'cytoplasmic male steritity'. **2**

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Q4 **State** TWO **functions of abscisic acid.** **2**

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Please see over/……

Answer All questions

Q5 Describe the process by which dormant seeds in arid soils germinate following a sudden rainstorm. **2**

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Q6 Define the term nigh-break lighting and states its application in the production of a **NAMED** plant/crop. **2**

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Q7 Describe **TWO** functions of a seedbank in the context of germplasm conservation. **2**

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Please turn over/……

Answer All questions

Q8 **Define the term minimum leaf number with reference to a** NAMED **plant.** **2**

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Q9 **Describe how the browning of pre-packed salad leaves may occur and state** TWO **methods of prevention.** 2

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Q10 **State** TWO **advantages of parthenocarpic fruit giving a** NAMED **example in** EACH **case.** **2**

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RHS LEVEL 3 DIPLOMA IN HORTICULTURE
WRITTEN EXAMINATION

Thursday 10 February 2005

IMPORTANT – Please read carefully before commencing.

i) The duration of the papers in Module **G** is **2 hours**.
ii) Answer **ONE** question from section **B** and **TWO** questions from Section **C**.
iii) **ALL** questions carry equal marks.
iv) Write your answers legibly in the answer booklet provided.
v) Use metric measurements only.
vi) Where plant names are required they should include genus, species and where appropriate, cultivar.

Module G

Genetics and Plant Breeding
Physiology of Flowering, Reproduction and Development

Sections B & C

Structured Questions

Please turn over/……

Section B – Genetics and Plant Breeding

Answer ONE question from this section.

			Marks
Q1	a)	Describe the techniques of producing open pollinated seed and F_1 hybrid seed giving an example of each.	**10**
	b)	List the advantages and limitations of F_1 hybrid seed.	**4**
	c)	Evaluate the potential outcomes of plants produced by genetic modification.	**6**
Q2	a)	Review the role of herbaria and botanical gardens in relation to **EACH** of the following:	
		i) plant collecting;	**4**
		ii) classification;	**4**
		iii) conservation.	**4**
	b)	Describe **FOUR** techniques for the preservation of genetic material.	**8**

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Please see over/…….

Section C – Physiology of Flowering, Reproduction & Development

Answer TWO questions from this section.

			Marks
Q3	a)	Explain why monoculture and the exclusion of weeds is normally adopted in horticultural crop production.	**8**
	b)	Review how an appreciation of weed biology can be used in order to maximize yield and quality.	**12**
Q4	a)	Describe **EACH** of the following: i) leaf area index; ii) net assimilation rate; iii) plant growth rate; iv) marketable yield.	**12**
	b)	Explain how crop spacing and plant density influences a **NAMED** crop.	**8**
Q5	a)	Explain how **FIVE NAMED** endogenous plant growth regulators affect plant growth and development.	**10**
	b)	Describe **FIVE** horticultural uses of **NAMED** synthetic growth regulators.	**10**
Q6	a)	Describe how the end products of respiration affect the growth of plants.	**12**
	b)	Explain with reference to **TWO NAMED** crops, the problems associated with anaerobic respiration.	**8**

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RHS (LEVEL 3) DIPLOMA IN HORTICULTURE

Thursday 10th February 2005

MODULE G

Genetics and Plant Breeding
Physiology of Flowering, Reproduction and Development

Examiners Comments

Candidates Registered	49		Total Candidates Passed		
Candidates Entered	35	(71.4%)	Passed with Commendation	3	(8.6%)
Candidates Absent	7	(14.3%)	Passed	23	(65.7%)
Candidates Deferred	7	(14.3%)	Failed	9	(25.7%)
Candidates Withdrawn	0	(0%)			

General Comments by Senior Examiner.

The ability to write concise, factual information relevant to the particular question is a major factor in successful examination preparation. However candidates who have been awarded higher marks have paid close attention to a number of other important points, as follows:

1) Carefully read the rubric at the top of the page in order that you are clear on what is required of each paper.

2) Do not rush to answer a question that immediately appeals, take time to read the papers and questions thoroughly.

3) Interpret the meaning of key words such as ‘evaluate’, ‘describe’ and ‘explain’ etc. Ensure that you understand in advance the examination and what is meant by these key words.

4) Look carefully at the mark allocation to each section. It is a good indicator as to how much information and time should be allocated to the section. Many candidates appear to ignore this with the result that either a lot of time is spent answering a section which may have a comparatively low mark, or little time is devoted to a section carrying higher marks.

5) Within the structured questions, it is important to keep to the specific sections. Some candidates have ignored this and rolled all sections into one making the marking of the question more difficult.

6) Diagrams can be very helpful and supportive to an answer. They should be large, clear and well labelled, without unnecessary adornment of colour.

7) Ensure that when requested suitable examples are given in particular plants, the full botanical name should be provided.

8) Examination technique needs to be considered with regard to time management and answer planning to ensure the writing of succinct, factually correct and unambiguous answers.

9) All candidates should ensure that prior to sitting the examination they receive practice at answering past examination questions. This enables familiarisation and practice with examination technique and the opportunity to have questions marked and comments made by their course tutor.

10) Attention is also drawn to the suggested reading list identifying a number of useful texts that will help prepare the candidate for the examination. This is obtainable from the Examinations Department at Wisley.

Section A. Short Answer Questions

*Q1. Name **FOUR** morphological plant characteristics which may be used in plant identification.*

This question was well answered. Allowance was made for the fact that about a quarter of candidates cited 4 different floral parts in the answer, rather than the plant as a whole.

*Q2. Describe the structure and function of **EACH** of the following:*
i) mitochondria;
ii) nucleolus.

This question was poorly answered. Candidates described either the structure or function of the organelles but omitted to answer the question as set. A poor understanding of the structure and function of the nucleolus was demonstrated

Q3. Define the term 'cytoplasmic male sterility'.

High marks were awarded for stating that this results in a condition where functional pollen is not produced and how the condition is determined

*Q4. State **TWO** functions of abscisic acid.*

This question was well answered. High marks were awarded when candidates stated the role of ABA in stomatal opening.

Q5. Describe the process by which dormant seeds in arid soils germinate following a sudden rainstorm.

This question was quite well answered. However, the majority of answers omitted to describe the leaching of seed coat inhibitors

*Q6. Define the term night break lighting and state its application in the production of a **NAMED** plant/crop.*

Candidates were able to define night break lighting succinctly but because of not stating details of its application in the production of a plant/crop which was correctly botanically named, candidates would not be rewarded.

*Q7. Describe **TWO** functions of seed bank in the context of germ plasm conservation*

As a result of moderation this question was ambiguous and so allowance was made for various types of seed storage. High marks were gained by candidates who described classification, evaluation and dissemination of accessions

Q8. Define the term minimum leaf number with reference to a named plant.

High marks were awarded for a clear definition of minimum leaf number. Marks were not gained because of omitting to give a relevant NAMED plant.

*Q9. Describe how the browning of pre-packed salad leaves may occur and state **TWO** methods of prevention.*

This question was poorly answered. Low marks were awarded when candidates omitted to describe the oxidation of cut surfaces

*Q10. State **TWO** advantages of parthenocarpic fruit giving a **NAMED** example in **EACH** case.*

This question was quite well answered. High marks were awarded for answers that stated the direct advantage of parthenocarpy to the named example.

Section B. Structured Questions (Genetics and Plant Breeding)

Q1. *a)* *Describe the techniques of producing open pollinated seed and F_1 hybrid seed giving an example of each*

b) *List the advantages and limitations of F_1 hybrid seed.*

c) *Evaluate the potential outcomes of plants produced by genetic modification.*

a) This section was poorly answered. Candidates did not discuss **techniques** but concentrated on a particular breeding technique to the exclusion of all others.
b) This section was well answered. Candidates were awarded high marks for citing a comprehensive list of advantages and disadvantages.
c) This section was poorly answered. Candidates demonstrated a lack of understanding of the technology. Low marks were awarded when arguments which were either unsubstantiated or not underpinned by scientific research were cited. High marks were awarded for an **informed** evaluation of GM and its value to horticulture.

Q2. *a)* *Describe the role of herbaria and botanical gardens in relation to **EACH** of the following:*

i) *plant collecting;*
ii) *classification;*
iii) *conservation;*

b) *Describe FOUR techniques for the preservation of genetic material.*

a) This question was poorly answered. The roles of herbaria and botanical gardens were not well reviewed. Candidates demonstrated a lack of understanding of the different roles of both institutions and a lack of knowledge of their key but separate functions.
b) High marks were awarded for clear, concise descriptions of low temperature, dry seed storage, storage in liquid nitrogen at **-196ºC** and in situ conservation of storage organs and recalcitrant seeds.

Section C. Structured Questions (Physiology of Flowering, Reproduction & Development).

Q3. *a)* *Explain why monoculture and the exclusion of weeds is normally adopted in horticultural crop production.*

b) *Review how an appreciation of weed biology can be used in order to maximise yield and quality.*

Question three was popular, however, just below 50% of candidates failed to achieve a pass. Some misunderstanding over the term monoculture was demonstrated, and the section on weed biology was very poorly answered by several candidates. The importance of using different control strategies for different weed types was mainly lacking and few candidates mentioned seasonality of emergence of different weed species. Nocturnal cultivation as a method of weed control was described by several candidates!

Q4. *a)* *Describe **EACH** of the following*
i) leaf area index;
ii) net assimilation rate;
i) plant growth rate;
ii) marketable yield.

b) *Explain how crop spacing and plant density influences a **NAMED** crop.*
Question four despite being a highly structured question was less popular. Several candidates were unable to provide the definitions requested and the section on plant density was very poorly attempted by several candidates. At least two candidates failed to comply with the rubric asking for the influence of density in one named crop example, n.b. candidates should be aware of these items and the work undertaken by the National Vegetable Research Station when it existed.

Q5. *a)* *Explain how **FIVE NAMED** endogenous plant growth regulators affect plant growth and development*

b) *Describe **FIVE** horticultural uses of **NAMED** synthetic growth regulators*

Question five was the most popular question in section C of Module G. All candidates achieved a pass and three candidates were awarded full marks. The section on endogenous plant growth regulators was very fully answered by most candidates whereas the section on use of synthetic growth regulators was less comprehensively answered by some candidates. In some cases the named growth regulator was incorrect.

Q6. a) *Describe how the end products of respiration affect the growth of plants.*

b) *Explain with reference to TWO NAMED crops, the problems associated with anaerobic respiration.*

The least popular question was with only three candidates attempting it. The responses consisted mainly of a miscellany of information about cellular metabolism and some brief details of light and dark reactions of photosynthesis. It is important that candidates relate the question to named crops and that the problems are relevant to that crop. It was clear that candidates did not feel comfortable with an understanding of respiration at Diploma level.

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