Including Examiners comments

RHS
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R3104

UNDERSTANDING APPLIED PLANT PROPAGATION

Level 3

Wednesday 12 February 2020

15:55 – 16:45

Written Examination

Candidate Number: .....

Candidate Name: .....

Centre Name: .....

IMPORTANT – Please read carefully before commencing:

i) The duration of this paper is **50** minutes;
ii) **ALL** questions should be attempted;
iii) **EACH** question carries **10 marks**;
iv) Write your answers legibly in the spaces provided. It is **NOT** necessary that all lined space is used in answering the questions;
v) Use **METRIC** measurements only;
vi) Use black or blue ink only. Pencil can be used for drawing purposes only. Ensure that all diagrams are labelled accurately with the line touching the named object;
vii) Where plant names are required, they should include genus, species and where appropriate, cultivar;
viii) Where a question requires a specific number of answers; only the first answers given that meet the question requirement will be accepted, regardless of the number of answers offered;
ix) Please note, when the word **'distinct'** is used within a question, it means that the items have different characteristics or features.

Ofqual Unit Code J/505/8534

ANSWER ALL QUESTIONS

MARKS

Q1 Describe the production of **ONE NAMED** chip budded ornamental tree under **EACH** of the following headings:

i) rootstock selection **2**
ii) budding technique (outline only) **4**
iii) containerisation **3**

Name of tree: …… **1**

i)……

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ii)……

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MARKS

iii) .....

Total Mark

Please turn over/…..

MARKS

Q2 a) Describe how a heated propagator functions to provide an ideal environment for leafy softwood cuttings from a **NAMED** plant. **5**

Name of plant: **1**

MARKS

b) Explain how the environment provided in the propagator aids rooting of these cuttings. **4**

Total Mark

Please turn over/…..

MARKS

Q3 a) Describe what is meant by the 'after ripening' process for seeds. **2**

b) Name **TWO** species that produce seeds with a requirement for 'after ripening'. **2**

Please see over/…..

	MARKS
c) Describe the treatment required for **EACH** of the seeds named in b) to promote the germination process.	**6**

Total Mark

Please turn over/…..

MARKS

Q4 a) Identify **THREE** facilities that are used for the propagation of a **NAMED** plant by internodal cuttings, (excluding a heated propagator). **3**

Named plant: **1**

Please see over/…..

MARKS

b) Describe the anatomical and physiological importance of **EACH** of the following for vegetative propagation:

i) node **3**
ii) petiole **3**

i)……

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ii)……

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Total Mark

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R3104

UNDERSTANDING APPLIED PLANT PROPAGATION

Level 3

Wednesday 12 February 2020

Candidates Registered	**101**		**Total Candidates Passed**	**52**	**68%**
Candidates Entered	77	76%	Passed with Commendation	5	7%
Candidates Absent/Withdrawn	21	21%	Passed	47	61%
Candidates Deferred	3	3%	Failed	25	32%

General Comments

The majority of candidates attempted and completed all the questions.

Where named plant examples are asked for, **full botanical names were required** to achieve full marks: genus, species and where appropriate variety, cultivar etc. needed to be written and spelt correctly. Where genus alone was given, all species in that genus need to show the characteristic asked for to gain any credit. **Common names were NOT accepted** and misspellings were penalised. Candidates needed to use unambiguous plant examples from sources such as the RHS Plant Finder and/or the RHS A-Z Encyclopaedia of Plants together with examples given in the syllabus and avoid obscure or difficult to verify plant examples which risked being not credited.

Labels on diagrams needed to be carefully and correctly positioned to avoid ambiguity, not left hanging in mid-air. They needed to actually touch the appropriate part of the diagram. Annotations on diagrams were accepted as an alternative to description in the text as long as these were clear and answered the question. No marks were awarded for artistic merit or for unlabelled diagrams

Where a number of answers were specified in the question, e.g. 'List **TWO** plant names' or 'Describe **TWO** functions' **only the FIRST TWO answers** in a list were marked.

Candidates should take account of the command statements in the question e.g. 'list', 'describe', 'explain', together with the mark allocation, to judge the depth of the answer required. Extra information, even if it is accurate, does not gain extra marks.

MARKS

Q1 *Describe the production of **ONE NAMED** chip budded ornamental tree under **EACH** of the following headings:*

i)	*rootstock selection*	***2***
ii)	*budding technique (outline only)*	***4***
iii)	*containerisation*	***3***

Name of tree: ***1***

.....

Q1 Some candidates were able to state a tree suitable for chip budding, such as *Acer palmatum* or many of the ornamental or fruit bearing members of the Rosaceae family. Many candidates named examples which were not appropriate, such as shrubs *Rosa canina* or *Cotoneaster horizontalis,* or did not give the full botanic name of the chip budded tree.

i) Those candidates who focussed the information in their answer on the exact criteria for rootstock selection were awarded marks for criteria such as virus, pest and disease free, compatible with the scion and appropriate size at budding height, e.g. stem diameter 7-12mm. Other valid points included rootstocks free of laterals and specific dwarfing rootstocks.

ii) Detail was lacking on the technique of budding in most candidates' answers. Describing the operation in the right sequence and with sufficient detail including factors such as timing of the operation, preparation of scion material and rootstock, dimensions of cuts and details of tying in the bud and the material used, would have gained the highest marks.

iii) This part of the question on containerisation was not answered well. Candidates who gave descriptive detail of type and size of container, an appropriate growing medium and nutrient base and also the also the placement of the budded tree into the container and method of filling with growing medium gained higher marks. Some candidates spent time describing the growing on of budded trees in the field which was not asked for.

			MARKS
Q2	*a)*	*Describe how a heated propagator functions to provide an ideal environment for leafy softwood cuttings from a **NAMED** plant.*	***5***
		Name of plant:	***1***
		.....	
	b)	*Explain how the environment provided in the propagator aids rooting of these cuttings.*	***4***

Q2

a) Suitable plants from which softwood cuttings can be taken are mainly perennials such as named cultivars of *Osteospermum*, and *Penstemon*. A wide range of plants were accepted as examples. However, many candidates named plants which were not recognised as being propagated by softwood cuttings but usually propagated commercially by other methods, e.g. semi-ripe or hardwood cuttings.

This question asked for ways in which the heated propagator itself operates to provide the required conditions for propagation. Those candidates who confined their answer to how the propagator functioned to provide the required rooting environment for a softwood cutting were awarded marks appropriately.

Valid points are that base heat is produced via heating cables or heat mats of some kind via thermostatic control, and air heating can be provided by cables mounted on the inside of the structure. Candidates who also included temperature control through automatic thermostats and stated that the cover also helped to maintain the temperature were also credited.

Atmospheric humidity within the propagator can be controlled by the cover to maintain the humidity levels, as well as ventilation through slats or lifting covers. Description of the source of water and its controlled addition to provide high humidity in the propagator also gained marks for candidates.

Details of the effects of heat or ventilation on the cuttings were not needed in the answer to this part of the question.

b) Candidates were asked to explain how the environment provided by the propagator aids the rooting of cuttings.

Answers which were awarded marks included base heat encourages faster respiration, callus formation and root initiation. Cooler air temperatures reduce transpiration stress in the leafy cuttings and high atmospheric humidity reduces transpiration which enables cuttings to remain turgid, for continuing photosynthesis and physiological activities.

			MARKS
Q3	*a)*	*Describe what is meant by the 'after ripening' process for seeds.*	***2***
	b)	*Name **TWO** species that produce seeds with a requirement for 'after ripening'.*	***2***
	c)	*Describe the treatment required for **EACH** of the seeds named in b) to promote the germination process.*	***6***

Q3 a) After ripening is a process which allows the embryo to complete development after the seed is shed from the plant. Candidates who gave more detail by specifying a biochemical change, e.g. lowering of abscisic acid levels in the seed, or physical changes e.g. further maturation of the embryo, that occur in a dormant seed to ensure seed germination would take place gained maximum marks.

b) Good examples given by candidates of species with seeds that required 'after ripening' were *Ilex aquifolium* and *Fraxinus excelsior* with other correct examples also gaining marks.

c) Details of temperatures and time periods for treatment for the selected examples given by candidates were often correct. The expected level of detail to gain high marks is shown in this example for *Fraxinus excelsior* seed. A treatment of warm temperatures of 15 - 20^{o}C for 2-3 months followed by cooler temperatures at 4^{o}C for a similar period, followed by storage at low temperatures less than 0^{o}C and low moisture levels 10-12% for 4 months would ensure uniform germination. Marks were also given for appropriate media, aeration and moisture content sufficient to prevent dehydration during the treatment.

A number of the candidates provided details of the extraction of the seed, which was not part of the question. Other answers included incorrect sequences of the treatment with cold treatment first and could not be awarded marks.

			MARKS
Q4	a)	*Identify **THREE** facilities that are used for the propagation of a **NAMED** plant by internodal cuttings, (excluding a heated propagator).*	***3***
		Named plant:	***1***
		……..……..	
	b)	*Describe the anatomical and physiological importance of **EACH** of the following for vegetative propagation:*	
		i) node	***3***
		ii) petiole	***3***

Q4 a) Naming of three facilities required for propagation of internodal cuttings was generally well done. Marks were awarded for the appropriate examples such as a mist unit, fog unit, closed case, or cold frame. A wide variety of plants can be propagated by internodal cuttings such as climbing plants, e.g. *Clematis* spp. and *Hedera* spp. but not all of the examples suggested by candidates as being able to be propagated in this way would be successful.

b) **i)** and **ii)** Candidates were expected to describe the anatomical and physiological importance of the node and petiole in vegetative propagation for maximum marks.

Many were able to describe the physiological importance including the production of auxins for root initiation and also the presence of meristematic tissue, or cambium with its specific location in the node for production of callus tissue, adventitious roots and shoots.

Additional features relevant to the importance of the petiole were that it provided physical anchorage in the medium and that the tissues responded to blanching resulting in improved root initiation. Specific naming and location of meristematic tissue in the petiole was also credited.