

Autumn Examinations 2015/16

Module Title: Plant Breeding

Module Code: AGRI 8009

School: Business and Humanities

Programme Title: Bachelor of Science in Horticulture

Programme Code: BHORT_7_Y4, SHERB_8_Y3, SHERB_8_Y4

External Examiner(s): Dr. Philip Dix
Internal Examiner(s): Mr. George Murphy

Instructions: Answer any FOUR questions. All questions carry equal marks.

Duration: 2 Hours

Sitting: Winter 2015

Requirements for this examination:

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper.
If in doubt please contact an Invigilator.

- Q. 1 (a)** Briefly describe what is defined by a D.U.S. test i.e. a Cultivar or a Variety (4 Marks)
- (b)** Describe EACH component of the D.U.S. criteria in order.
- (i)** D..... (5 Marks)
 - (ii)** U..... (5 Marks)
 - (iii)** S..... (2 Marks)
- (c)** With reference to **part (b) (ii) and (iii)** briefly describe the essential difference in approach between the United States and the European Union. (9 Marks)
- Q. 2 (a)** Environmental stresses are often desirable to breed tolerance to. Describe the environmental stress caused by heavy metal tolerance under the following headings:
- (i)** Sources causes and threats (5 Marks)
 - (ii)** Factors involved in the stress for plant growth. (7 Marks)
 - (iii)** Natural biological sources of plant tolerance to or avoidance of the stress (3 Marks)
- (b)** With regard to the nature of the stress and sources of tolerance discussed above: **Briefly** discuss considerations **and** solutions to production of plant cultivars, which display elevated heavy metal tolerance, for the purpose of revegetating mine tailings under the following headings (provide examples where applicable):
- (i)** Species selection (6 Marks)
 - (ii)** Starting material (4 Marks)
- Q. 3 (a)** **Briefly** define “Biological Yield” AND describe how it is used in breeding. (4 Marks)
- (b)** List THREE leaf or canopy related strategies for improving Biomass. (6 Marks)
- (c)** Describe the phrase “economic yield” giving examples where appropriate. (5 Marks)
- (d)** **Briefly** describe what is meant by an ideotype (2 Marks)
- (e)** Describe *Sorgum bicolor* with reference to
- (i)** Its usage and cropping profiles (2 Marks)
 - (ii)** **Briefly** describe TWO possible ideotypes of this crop. (6 Marks)

- Q. 4 (a)** VCU trials are conducted in Ireland on several crops.
 (i) Name THREE crops which are trialled in Ireland NOT including forage grass species **(3 Marks)**
 (ii) What is meant by VCU and what does it stand for **(6 Marks)**
- (b)** Forage grasses in are tested in Ireland for VCU.
 With regard to *Lolium perenne*
 (i) Name AND describe ONE quantitative measure of yield as measured in the Irish VCU trials and how it is expressed for tested cultivars. **(4 Marks)**
 (ii) Name AND describe TWO qualitative measures which breeders must take into account when producing new cultivars. **(8 Marks)**
- (c)** Name the poidy levels of cultivars of *Lolium perenne* used in forage AND list the traditional differences between them. **(4 Marks)**
- Q. 5 (a)** Define the phrase “Plant Breeding”. **4 Marks**
- (b)** List THREE considerations a breeder must take into account with regard to the aims of a breeding program which indicate possibility of success. **6 Marks**
- (c)** Using *Solanum lycopersicum* as an example briefly describe TWO different markets/usages that cultivars can be bred for/ suited to, **not** including the home grower market. **6 Marks**
- (d)** Describe the “ware” market under the following headings:
 (i) How the product is packaged and sold. **(4 Marks)**
 (ii) The preferred cultivar requirements of this market in including a brief description of the production system. **(5 Marks)**