

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATIONS**

**FIRST YEAR EXAMINATION FOR THE AWARD DEGREE OF  
MASTER OF SCIENCE IN HORTICULTURE**

**HORT 818: GENETICS AND BREEDING OF HORTICULTURAL CROPS**

**STREAM: M.Sc. AGRIC ( Y1 S1)**

**TIME: 3 HOURS**

**DAY/DATE: MONDAY 14/12/2020**

**8.30 A.M – 10.30 A.M.**

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**INSTRUCTIONS:**

- Answer question in ONE and any TWO questions.
- Do not write anything on the question paper

**QUESTION ONE (20 MARKS) : COMPULSORY**

- (a) *Nurospora crasa* has 7 chromosomes, *Solanum tuberosum* has 48 chromosomes and *Phaseolus vulgaris* has 22 chromosomes. Using the choices of ploidy level and with reason(s), deduce the ploidy level of each species. [6 Marks]
- (b) A plant geneticists made a useful application of polyploidy by developing a triploid watermelon.
- (i) Describe how the geneticist produce this triploid watermelon using two other strains of different ploidy level. [6 Marks]
- (ii) Explain why the triploid watermelon will be mostly seedless. [4 Marks]
- (iii) Explain how it would be possible for a seed to occasionally develop. [4 Marks]

**QUESTION TWO (20 MARKS)**

- (a) Suppose you are working with tomato and find that it is not possible to get natural variation of trait of interest. Using THREE genome editing techniques, explain how you can create variability for this trait. [12 Marks]
- (b) Describe application of homologous recombination in horticultural crops breeding. [8 Marks]

**QUESTION THREE (20 MARKS)**

- (a) Explain with suitable examples the use of alien-addition and alien-substitution lines in crop improvement. [12 Marks]

- (b) Describe application of cytoplasmic male sterility in vegetable hybrid seeds production, giving the breeding scheme requirements. [8 Marks]

**QUESTION FOUR (20MARKS)**

- (a) Describe how you can incorporate a tomato blight resistant gene controlled by a recessive gene into a farmers preferred blight susceptible variety. [12 Marks]
- (b) Discuss barriers that you can experience while making a cross between nightshade (*Solanum nigrum*) and buffalo bur (*Solanum rostratum*). [8 Marks]
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