



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

**SECOND YEAR SECOND SEMESTER EXAMINATIONS FOR
THE DEGREE OF MASTER OF SCIENCE IN PLANT
BREEDING**

MAIN CAMPUS

AAG 824: ADVANCED PLANT BREEDING

Date: 11th April, 2017

Time: 2.00 - 5.00pm

INSTRUCTIONS:

- Answer ALL Questions

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FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF MASTER OF
SCIENCE IN PLANT BREEDING AND GENETICS

AAG 824: ADVANCED PLANT BREEDING

Date: 11th April 2017

Time: 9-12.00

Answer all questions

- Q1. Write short notes on the following
- Bridging species in interspecific hybrids. 5 marks
 - Vertical disease resistance. 5 marks
 - Resistance gene pyramiding. 5 marks
- Q2. A plant breeder in coastal Kenya tried to cross *Sesame indicum* (sesame) to its wild relative *S. calycinum* without success. The aim of the breeding program was to transfer webworm resistance from the wild species to sesame. The breeder was later delighted to have found a fertile hybrid between *S. Calycinum* and *S. latifolium*. The latter species can give fertile allotetraploid hybrids with *S. indicus*. *S. latifolium* is susceptible to webworm.
- Why was the breeder delighted about the discovery of the hybrids between *S. latifolium* and *S. calycinum*? (4 marks)
 - Give an outline of the procedure to get an acceptable sesame variety that is resistant to webworm. (10 marks)
- Q3. When commenting on Nicolay Vavilov's contribution to plant breeding a scientist said, "When Vavilov made his trips to centers of diversity in early part of 20th century he observed that such centers were very rich in genetic stocks. However, such stocks have seriously dwindled by late 1970's". Explain what might have led the scientist to make such a comment. (8 marks)
- Q4. In a maize breeding program heritability h for seed yield per ear was 0.5. The top 10% plants is mass selected from an open pollinated variety with total phenotypic variance, $0P$, of 150. The mean grain yield per ear is 400g.
- What will be the performance of the improved maize population following one generation of mass selection? (7 marks)
- Hints:
- | % selected | Selection intensity, i . |
|------------|----------------------------|
| 1 | 2.64 |
| 2 | 2.42 |
| 5 | 2.06 |
| 10 | 1.76 |
| 20 | 1.40 |
- Selection Response, R , = $ihc0P$. c is parental control factor.
- Mention any two methods of improving the selection method used in the program. (6 marks)

- Q5. Multiline varieties development is one way of addressing disease as a crop production problem. However, this plant breeding method is not widely used to develop crop varieties. Which problems associated with multiline varieties have prevented the popularization of multiline varieties? (10 marks)
- Q6. Give an outline of "recurrent selection" proposed by Compton in 1968. (10 marks) Can this question be generally on Recurrent selection?
- Note: This paper does not cover broadly advances in plant breeding or even the wide area of plant breeding!!