

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME – LEVEL 05

FINAL EXAMINATION – 2012/2013

BOTANY

BOU3106/BTU3111/BOE5106/BTE 5111 – PLANT BREEDING



DURATION : TWO (02) HOURS

DATE : 10. 12. 2013

TIME : 1.30 – 3.30 p.m.

ANSWER ANY FOUR (04) QUESTIONS

1.
 - a) What is heritability ?
 - b) Two homozygous varieties of yellow beans were crossed to produce F_1 hybrids. The average phenotypic variance in yield of the three populations P_1 , P_2 and F_1 , was 10.60. The variance of F_2 was 20.60.
 - i) Calculate the heritability of yield in the F_2 population.
 - ii) Do you think that subsequent selection in future generations would be successful in further changing the yield in yellow beans ?
 - c) How does heritability become useful in a breeding programme ?
2.
 - a) A clone is always propagated and maintained vegetatively. This is how mainly a clone differs from the pure line of self pollinated crops and inbred of cross pollinated crops.
Mention the main differences among pure line, inbred and clone.
 - b) Give an account of the procedure of clonal selection of asexually propagated plants.
 - c) What are the advantages and drawbacks of clonal selection ?
3.
 - a) What are the four (04) main factors which contribute to the change in gene frequencies of a population.?
 - b) Explain briefly how each factor causes change in the gene frequency.

- c) Give a brief account of the Average effect (α), Breeding value (A) and Dominance deviation (D)
- d) Find out the Breeding values and Dominance deviations of the following genotypes.

(Assume that the frequency of allele X_1 (q) is 0.4)

GENOTYPE	X_1X_1	X_1X_2	X_2X_2
GENOTYPIC VALUE	120	160	100

4. a) What are the uses of tissue culture techniques in plant breeding?
- b) Embryo rescuing is one of the applications of tissue culture in plant breeding. Explain what embryo rescue is, and describe its use/s.
- c) Somoclonal variations are often found among plants which have been propagated through tissue culture.
- i) What is somoclonal variation ?
- ii) Explain how somaclonal variation can be utilized for crop improvement.
5. a) Hybrid varieties are very common among crop plants today. Giving an example explain how a hybrid variety is produced.
- b) What is Hybrid Vigour ?
- c) Explain briefly how Hybrid Vigour is utilized in a breeding programme.
6. a) Several types of selection methods are applied for cross pollinated plants. What are they ?
- b) What is recurrent selection ?
- c) Name the different types of recurrent selection methods available and describe them.
- d) Use a flow chart to explain the main steps involve in the Simple Recurrent Selection method.