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SARDAR PATEL UNIVERSITY

M.Sc. (Genetics) – Third Semester Examination
Tuesday 4th December, 2012
2:30 p.m. to 5:30 p.m.
PS03CGEN03: Genetics in Crop Improvement

Total Marks: 70

Note: (1) Figures to the right indicate marks.
(2) Draw a neat and labeled diagram, wherever necessary.

Q. 1 Choose the most appropriate answer from the four alternatives given: **[08]**

(i). Heterosis term was proposed by

(a) G.H. Shull (b) G.H. Shukla
(c) G.H. Sharma (d) None of them

(ii). Mutagenic agents are

(a) Chloral hydrate and ether (b) Chloroform and colchicine
(c) Both (a) and (b) (d) None of them

(iii). Protoplast isolation technique generally involves:

(a) Sucrose phosphate synthase (b) Desaturase
(c) Cellulase, hemicellulase and pectinase (d) None of them

(iv). Which of the following produces androgenic haploid in anther cultures?

(a) Anther wall (b) Tapetal layer of anther wall
(c) Connective tissue (d) Young pollen grains

(v). Variations observed during tissue culture of some plants are known as

(a) Clonal variations (b) Somatic variations
(c) Somaclonal variations (d) Tissue culture variations

(vi). Which of the following has been widely used to provide resistance against plant viruses?

(a) Virus resistance genes from bacteria
(b) Expression of virus coat protein genes in transgenic plants
(c) Expression of anti-virus genes in vectors that transmit viruses
(d) None of them

(vii). Which of the following compounds has been produced in transgenic plants to improve tolerance to salt stress and water deficit?

(a) Sucrose (b) Mannitol
(c) Nicotine (d) Octopine

(viii). Random amplified polymorphic DNA (RAPD) is a method that

(a) Stimulate production of sense RNA to compensate
(b) Activate the expression of all genes in a biochemical pathway
(c) Reveals intra-specific variation and diversity between species
(d) None of them

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Q.2 **Answer any SEVEN from the following:** [14]

(i). Give brief note on pure line selection in self pollinated crops.

(ii). Write a short note on cytoplasmic male sterility.

(iii). Define anther and pollen culture.

(iv). Briefly explain the mechanism of chromosome elimination.

(v). Write applications of somaclonal variations.

(vi). Write a short note on pathogenesis related proteins.

(vii). What are transgenic plants? Enlist the roles of such plants in future crop improvement programs.

(viii). Differentiate between RFLP and RAPD.

(ix). Write any three methods used for assessing protoplast viability.

Q.3 (a) Give an account on procedures for back cross method in self pollinated crops. **[6]**

(b) What is ploidy breeding? Discuss any two methods for creating various ploidy levels. **[6]**

OR

(b) Discuss in detail about pedigree methods in self pollinated crops and its applications. **[6]**

Q.4 (a) Discuss in detail about chromosome elimination by Bulbosm method. **[6]**

(b) Give an account on potential of somatic hybridization in crop improvement programs. **[6]**

OR

(b) How will you isolate protoplast from the plant cells? Write applications of protoplast culture. **[6]**

Q.5 (a) Define somaclonal variations. Discuss any one scheme for obtaining somaclonal variations. **[6]**

(b) Give a note on: (i) Bt-toxin gene (ii) Cowpea trypsin inhibitor gene **[6]**

OR

(b) Briefly describe the various approaches used for production of virus resistant transgenic plants **[6]**

Q.6 (a) Explain the following: **[6]**

i) Antisense RNA technology for improved shelf life of fruits.

ii) Role of herbicide resistance in crop improvement program with suitable examples.

(b) What is marker assisted selection? Give a brief out line on nearly isogenic line (NIL) strategy in crop improvement programs. **[6]**

OR

(b) Briefly describe the role of genetic engineering in improvement of starch and lipid quality in transgenic crops. **[6]**