

IAS Mains Agriculture 1994

Paper-II

Section A

1. Answer any three of the following in about 200 words on each:

- a. In certain breeding stocks of maize, assume that gene A for increased vigour is closely linked with a recessive gene w, which makes the plant weak and that gene B for another quality also results in increased vigour but is closely linked with a recessive gene 1 for low viability.
 - i. Which combination would be most efficient for production of vigour?
 - ii. What kind of mating would produce the desired combination?
 - iii. What would be the likelihood of obtaining a pur breeding strain with superior vigour?
- b. Distinguish between:
 - i. Darwinism and Evolution
 - ii. Views of Darwin and Goldschmidt
 - iii. Random genetic drift and molecular drive
- c. Define apical dominance and its role in plant growth and development.
- d. Mention the characteristics and uses of 'ribozymes'

2. Answer the following questions

- a. What are IS elements? How do they differ from Tn elements?
- b. What role (s) do IS elements play in recombination? Also mention their role in the evolution of genetic elements.
- c. In E. Coli, the ability to utilise lactose depends on β -galactosidase and β -galactoside permease, which are coded for by two closely linked genes lacZ and lacY respectively; pro C, controls in part, the ability to synthesise proline, the alleles strand stt * control resistance and susceptibility to streptomycin. HfrH is known to transfer the two/ac genes, pro C and str, in that order during conjugation. A cross is made between HfrH of genotype lacZ-, lacY +. ProC +. StrS and an F of genotype lacZ + lacY-. Pro C-. Strr. After about two hours, the mixture is diluted and plated out on medium containing streptomycin, but on proline. When the resulting, proC +. Strr recombinant colonies were checked for their ability to grow on medium containing Lactose as the sole carbon source, very few of them were capable of fermenting lactose. When the reciprocal cross (HfrH lacZ +. LacY-. ProC +. Strs x F-lacZ-. LacY +. ProC-. Strr) was done many of the proC + str4 recombinants were able to grow on medium containing lactose as the sole carbon source. What is the order of the lacZ and lacY genes relative to pro C?

3. Describe the origin, domestication, climatic requirements-, propagation and orchard management of citrus, apple and grapes.

4. Discuss the impact of global climatic changes on photosynthesis and plant productivity in

Section B

5. Write short notes on any three of the following in about 200 words each:
- a. Role of Bt gene in biological control of pests
 - b. Seed health and quality testing in India
 - c. Transmission of plant viruses by insects
 - d. Storage pests of *Vigna* spp and their management
6. What do you understand by the “integrated pests and disease management (IPDM)” Give suitable examples of IPDM in sugarcane, cotton and potato indicating the reasons for each input.
7. Mention the major dietary deficiencies in India. Analyse the process to improve nutritional pattern in relation to cropping pattern and productivity. Indicate, in a tabular form, the ideal the available calorie value of food of working population.
8. What are the major seed-borne plant pathogens? Give examples from bacteria, fungi and viruses.

Discuss the critical levels of inoculum needed for an epidemic through seed-borne infection. What is the relation between seed-borne infection and seed transmission? Evaluate the advances in detection of pathogens in seeds and vegetative planting.