

9. Life cycle of dermestid beetles: Dermestid infested silkworm cocoons and estimation of incidence. 1 Prct.

V SEMESTER

PAPER-5 :- GENETICS AND BREEDING OF MULBERRY AND SILKWORM

3 hrs/week X 15 = 48 hrs.

Part-A: Cytogenetics and breeding of mulberry.

Unit-1

1. Ultra-structure of eukaryotic cell. 2 Hrs.
2. Ultra-structure of chromosomes; Special types of chromosomes- lampbrush and salivary gland chromosomes. 3 Hrs.
3. Cell division; Mitosis and Meiosis. 3 Hrs.

Unit-2

4. Brief account of polyploidy in plants- polyploidy in mulberry. 1Hrs.
5. Chromosomal aberration- Deletion, duplication, inversion and translocation. 2 Hrs.
6. Mutation- Types; mutagens; physical and chemical mutagenesis. 3 Hrs.
7. Germplasm bank: Importance; collection, characterization and maintenance. 2 Hrs.

Unit-3

8. Plant introduction and acclimatization; Quarantine. 2 Hrs.
9. Mulberry breeding: Objectives; selection methods; hybridization, polyploidy breeding and mutation breeding; breeding for disease and drought resistance. 5 Hrs.
10. Evaluation of selected genotypes and release of improved variety. 1 Hrs.

Part-B: Genetics and breeding of silkworm.

Unit-4

11. Structure and chromosome numbers in mulberry and non-mulberry silkworms- evolutionary significance of chromosomes in *Bombyx mori*. Linkage groups in *Bombyx mori*. 2 Hrs.
12. Sex determination mechanism in silkworm- importance of ZZ and ZW chromosomes- sex-limited races. 2 Hrs.
13. Gametogenesis- Oogenesis and Spermatogenesis 2 Hrs.
14. Genetic basis of voltinism and moulting in the silkworm, *Bombyx mori*. 2 Hrs.

Unit-5

15. Hereditary traits of silkworm egg and larva. 2 Hrs.
16. Genetics of cocoon colours- inheritance of cocoon colours. 2 Hrs.
17. Parthenogenesis in silkworm- types and induction of parthenogenesis. 2 Hrs.
18. Silkworm germplasm bank. 2 Hrs.

Unit-6

19. Introduction to silkworm breeding- inbreeding and out breeding concepts- objectives of silkworm breeding-techniques- different types of breeding methods- line breeding, cross breeding and mutation breeding. 4 Hrs.
20. Selection: Methods- individual and mass selection- fixation of characters- evolution of new breeds- race authorization. 2 Hrs.
21. Heterosis and hybrid vigour-exploitation of heterosis in silkworm- concept of single, double and polyhybrids. 2 Hrs.

Mulberry breeding;

- | | |
|--|---------|
| 1. Mulberry germplasm and Mulberry multilocational trials (field visit). | 1 Prct. |
| 2. Evaluation of breeding parameters in different mulberry varieties. | 2 Prct. |

7

- | | |
|---|---------|
| 3. Induction of tetraploidy in mulberry by using colchicin (Demonstration). | 1 Prct. |
| 4. Study of mitosis in onion root tip. | 2 Prct. |
| 5. Mulberry breeding equipments | 1 Prct. |

Silkworm breeding;

- | | |
|--|---------|
| 6. Study of meiosis in grasshopper and silkworm testis. | 2 prct. |
| 7. Identification of different races of silkworm cocoons- NB ₄ D ₂ .
KA, PM, C.Nichi, Nistari, CSR ₂ and CSR ₄ race/ breeds characters. | 1 prct. |
| 8. Identification of mutants of silkworm larva- zebra, ursa, knobbed and sex-limited
Races. | 2 prct. |
| 9. Comparative assessment of the hybrids and pure race cocoons. | 2 prct. |

Part-A: Silkworm seed production.

Unit-1

1. A general account of silkworm seed, grainages, production and demand trends. 2 Hrs.
2. Silkworm seed organisation, significance of seed organization; Basic seed multiplication centres- P4, P3, P2 and P1; Seed areas- identification, concept of selected seed rearers/ villages- Seed Legislation Act- maintenance of seed crops. Seed cocoon markets- pupal examination, certification of seed cocoon lots- price fixation for seed cocoons. 6 Hrs.

Unit-2

3. Disinfection and hygiene in seed production units. 2 Hrs.
4. Seed production centres (grainages)- types of grainages- organisation and functions of plan for model grainage- grainage equipments and their use - Seed production plan. 3 Hrs.
5. Procurement and transportation of seed cocoons- processing and preservation of seed cocoons- sex separation in seed cocoons. 2 Hrs.

Unit-3

6. Moth emergence and synchronisation; sex separation in moth; effect of improper synchronisation on egg hatching and quality-safe duration. 2 Hrs.
7. Coupling and decoupling; oviposition; method of egg production; refrigeration of male moths; mother moth examinations- individual and mass methods- dry moth examination; environmental conditions for grainage activity. 2 Hrs.
8. Egg disinfection- handling of multivoltine eggs- preservation of eggs to postpone hatching- ideal embryonic stages for cold storage- maximum duration of cold storage. 2 Hrs.

Unit-4

9. Handling of bivoltine eggs for early hatching- physical and chemical methods- hot and cold acid treatment. 2 Hrs.
10. Postponement of hatching; hibernation schedule for 3, 4, 6 and 10 month's duration. 3 Hrs.
11. Preparation of loose egg- advantages- handling of loose eggs; Incubation of eggs. 2 Hrs.

Part -B: Biotechnology;

Unit-5

12. Nucleic acids: Introduction- chemical structure of DNA and RNA- Watson and Crick model of DNA- Types of RNA- tRNA, mRNA and rRNA- DNA replication. 5 Hrs.
13. Protein synthesis: Synthesis of mRNA, RNA polymerase- polyribosomes- translation. Genetic code- salient features. 4 Hrs.

Unit-6

14. Introduction to recombinant DNA technology. 3 Hrs.

15. Brief account of tissue culture and morphogenesis; Its applications in crop improvement. 4 Hrs.
16. Brief account of genetic engineering- concept and technique. Applications in sericulture. 4Hrs.