

5. Counting of cells in given cell line sample using hemocytometer.
6. To study about cytotoxicity and cell viability.
7. Demonstration of transfection in cell lines using Photographs/Videos.
8. Demonstration of working of the following instruments:
 - i) Laminar Flow Hood
 - ii) Autoclave
 - iii) Humidified CO₂ Incubator
 - iv) pH Meter.
9. Project report on visit to animal cell culture labs

Essential/recommended readings

1. Freshney, R. IAN. (2021). *Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications* (8th Ed.).
2. Masters, John. R. W. (2000). *Animal Cell Culture: A Practical Approach* (3rd Ed.).
3. Butler, M. (2003). *Animal Cell Culture and Technology*. (2nd Ed.).

Suggestive readings

4. Davis, John. M. (2011). *Animal Cell Culture: Essential Methods*.
5. Bhatt, Sheelendra. M. (2011). *Animal Cell Culture: Concept and Application*.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

GENERIC ELECTIVE – 5:

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Locust and its management ALS ZOO GE 05	4	2	0	2	Class XII pass with Biology and Chemistry	NA

Learning Objectives:

The learning objectives of this course are as follows:

- The course aims to apprise the students of locust as one of the most dangerous pests of agricultural crops.
- It focuses on identification of locust, reasons of their swarming and migratory nature which gives immense economic loss leading to national emergency of food and fodder.
- The course provides knowledge about the control, monitoring and management strategies of locust.

Learning Outcomes:

By studying this course, students will be able to:

- learn about the importance of locust as serious pest that cause damage to the agro-ecosystems affecting the economy.
- learn about the habit, habitat, behaviour, morphology and different phases of locust.
- learn about the biology of locust and various methods of its control.

Theory:

Unit 1 (6 Hours)

Introduction, historical background, locust plague and upsurges, Systematic position of locusts and grasshoppers; habitat, behaviour and morphology of locusts. Difference between locusts and grasshoppers.

Unit 2 (9 Hours)

Locusts in India, distribution, life cycle: *Schistocerca gregaria*, *Patangasuccincta*, *Locusta migratoria*; damage caused by them.

Unit 3 (7 Hours)

Breeding seasons and breeding areas, swarming. biological phases: solitary, transients and gregarious and changes in their behavior, color and structure. Biotic theory of periodicity.

Unit 4 (6 Hours)

Locust management: National and international organizations - LWO, SALO, CALO, FAO, NLCC, IRLCO-CSA (International Red Locust Control Organization for Central and Southern Africa), swarm monitoring. Control methods- Mechanical and traditional, regulatory

practices, Chemical methods: ULV Sprays, dusting, baits, IGRs; advantages and disadvantages of different chemical control methods, biological practices: biopesticides, predators, parasitoids; Integrated Pest Management; Plant quarantine.

Unit 5 (2 Hours)

Socio-Economic importance: Impact on the health of fauna and humans; on agriculture.

PRACTICAL (60 hours)

1. Comparative study of different species of locusts through specimens /photographs.
2. Study of mouthparts, wings and legs of locust through specimens /photographs.
3. Study of sexual dimorphism in locust through specimens /photographs.
4. Study the life stages of the locust through specimens/slides/photographs.
5. Study of different tools used in the management of locust.
6. Study of different host plants of locust.
7. Visit to different institutes/stations/laboratories (submit a Report on visit/current status of locusts in India).

Essential/recommended readings

1. Ritchie, J. M., & Dobson, H. (1995). *Desert Locust, control operations and their environmental impact*. NRI bulletin 67, Hopps the printers Ltd.
2. Atwal, A. S.; & Dhaliwal, G. S. (2015). *Agricultural pest South Asia and their management* (8th Ed.). Kalyani publishers.
3. Pradhan, S. (2016). *Agricultural Entomology and Pest Control*. ICAR publication.
4. Pandey, & Kumari R. (2021) *Locust in Indian Agriculture*. Notion press India.

Suggestive readings

1. Rachadi, Tahar (2010). *Locust control handbook*. CTA publication, AJ Wageningen-The Netherlands.
2. Krall, S; Peveling, R & Diallo, D. Ba. (1997). *New strategies in Locust Control*. Pirahauser Basel springer.

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