

GUJARAT UNIVERSITY
SKILL ENHANCEMENT COURSES
EFFECTIVE FROM JUNE-2023
B.SC. ZOOLOGY - SEMESTER I - APICULTURE
SEC-APC-116 2 CREDITS

Course Objectives:

To help the student to become familiar with the significance of beekeeping as an economically viable industry. It will help them to understand the different species of honeybees, their biology, behaviour and role in pollination. To train the students to learn the techniques of honey bee rearing, optimization of techniques based on climate and geographical regions, and various measures to be taken to maximize the benefits. To understand the significance of beekeeping in the diversification of agriculture for the rural communities to increase their income and create employment opportunities and at the same time to develop entrepreneurial skills required for self-employment in the beekeeping sector.

Course Outcome:

By the end of the course, the students will be able to: Comprehend the various species of honey bees in India, their social organization and its importance. Appreciate the opportunities and employment in apiculture – in public, private and government sector. Gain thorough knowledge about the techniques involved in bee keeping and honey production. Make various products and by-products obtained from beekeeping sector and their importance. Develop entrepreneurial skills necessary for self-employment in beekeeping sector.

SYLLABUS

Unit 1:

Biology of Bees. Historical background of apiculture, classification and biology of honey bees, Social organization of bee colony, behavioral patterns (bee dance, swarming). Rearing of Bees. Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth; Bee Pasturage; Selection of bee species for apiculture –*Apis cerana indica*, *Apis mellifera*; Bee keeping equipment methods of extraction of honey (Indigenous and Modern) & processing; Apiary management - Honey flow period and lean period, effects of pollutants on honeybees.

Practical:

1. Study of the life history of honey bees: *Apis cerana indica*, *Apis mellifera*, *Apis dorsata*, *Apis florea*, *Melipona* sp. from specimen/ photographs - Egg, larva, pupa, adult (queen, drone, worker).
2. Study of morphological structures of honey bees through permanent slides/photographs– mouthparts, antenna, wings, sting apparatus and temporary mount of legs (antenna cleaner, mid leg, pollen basket).
3. Study of natural beehive and identification of queen cells, drone cells and brood.
4. Distinguishing characters of workers of three bee species.
5. Importance of site selection for bee keeping.
6. Study of an artificial hive (Langstroth/Newton), its various parts and beekeeping equipment: draw diagrams of bee boxes proportionate to the body size and measure the body length and wing size.
7. Preparation of mount of pollen grains from flowers.

Unit2:

Diseases and Enemies: Bee diseases control and preventive measures: enemies of bees and their control. Bee Economy: Products of apiculture industry (Honey, Bees Wax, Propolis, Royal jelly, Pollen etc.) and their uses; Modern methods in employing artificial Beehives for cross pollination in horticultural gardens- stationary and migratory bee keeping. Entrepreneurship in Apiculture: Bee keeping industries – Recent advancements, employment opportunities, economics in small and large-scale beekeeping, scope for women entrepreneurs in beekeeping sector, study of development programs and organizations involved in beekeeping in India.

Practical:

1. Diagnosis of honeybee diseases: Protozoan diseases, Bacterial diseases, Viral diseases (one each)-symptoms, nature of damage and control.
2. Identification of honeybee enemies: Predators-Insects and non-insects.
3. Video demonstration of wax extraction and preparation of comb foundation sheets.
4. Analysis of honey – purity, physical and biochemical parameters (any two constituents).
5. Study of bee pasturage – visit to fields/gardens/orchards for studying the bee activity (role in pollination, nectar collection, videography of honeybee activity) and preparation of herbarium of nectar and pollen yielding flowering plants (floral mapping).
6. Visit to an apiary/honey processing unit/institute and submission of a report.

Books/References:

- Singh, S. (1962) Beekeeping in India, Indian Council of Agricultural Research, New Delhi.
- Mishra, R.C. (1995). Honeybees and their management in India. Indian Council of Agricultural Research, New Delhi.
- Prost, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.
- Rahman, A. (2017). Beekeeping in India. Indian Council of Agricultural Research, New Delhi.
- Gupta, J.K. (2016). Apiculture, Indian Council of Agricultural Research, New Delhi.