

INSTITUTE	FACULTY OF AGRICULTURE
PROGRAM	BACHELOR OF SCIENCE (Hons.) AGRICULTURE
SEMESTER	4
COURSE TITLE	MANAGEMENT OF BENEFICIAL INSECTS
COURSE CODE	16AS0404
COURSE CREDITS	2

Objective:

- 1 To provide information regarding Identification, mass rearing, conservation of apiculture, sericulture and lac culture.
- 2 To explore information regarding Identification, mass rearing, conservation of field release of natural enemies and its role.

Course Outcomes: After completion of this course, student will be able to:

- 1 Students will be able to understand the concept of commercial entomology for doubling farmers' income.
- 2 Students will be able to know the field release techniques of bio-control agents and their conservation.
- 3 Students will be able to apply the concept for skill development on different rearing techniques of economically important and other beneficial insects.
- 4 Students will be able to apply the knowledge for entrepreneurial opportunities in entomology.
- 5 Students will analyze the scope, importance and uses of beneficial insects.
- 6 Students will gain knowledge regarding the economic entomology and processed products obtained by it.

Pre-requisite of course:To know the beneficial insects and its management.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
1	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	1 Importance of beneficial Insects, Beekeeping, pollinating plant and their cycle, bee biology, species of honey bees, commercial methods of rearing, equipment used, seasonal management, bee enemies and diseases. Bee pasturage, bee foraging and communication. Division and uniting of honey bee boxes. Toxicity of pesticides to honey bees.	4

Contents : Unit	Topics	Contact Hours
2	2 Types of silkworm, voltinism and biology of silkworm. Mulberry/castor cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing and mounting larvae and harvesting of cocoons. Pest and diseases of silkworm and management. Rearing appliances of mulberry silkworm and methods of disinfection.	5
3	3 Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac- products. Enemies of lac insects.	2
4	4 Identification of major parasitoids and predators commonly being used in biological control. Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance.	4
Total Hours		15

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	1 Honey bee species, castes of bees	2
2	2 Beekeeping appliances and seasonal management, bee enemies and disease	2
3	3 Bee pasturage, bee foraging and communication	2
4	4 Division and uniting of honey bee boxes	2
5	5 Migration of honeybee boxes	2
6	6 Types of silkworm, voltinism and biology of silkworm	2
7	7 Mulberry/castor cultivation, mulberry varieties and methods of harvesting and preservation of leaves	2
8	8 Species of lac insect, host plant identification	2
9	9 Identification of other important pollinators, weed killers and scavengers	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
10	10 Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques	2
11	11 Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies	2
Total Hours		22

Textbook :

- 1 NA, NA, NA, NA

References:

- 1 Integrated Pest Management: Concepts and Approaches, Integrated Pest Management: Concepts and Approaches, G. S. Dhaliwal, and R. Arora, Kalyani Publisher, 2002
- 2 Agricultural Entomology and Pest Control, Agricultural Entomology and Pest Control, S. Pradhan, ICAR Publication , 1983
- 3 Entomology and Pest Management, Entomology and Pest Management, L. P. Pedigo, Macmillan Publishing Company, 1989
- 4 Insects and Mites of Crops in India, Insects and Mites of Crops in India, M. R. G. K. Nair, ICAR Publication, 1975

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
25.00	25.00	20.00	10.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board may also use any of tools such as demonstration, role play, quiz, brain storming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.