

## SEMESTER –VII

### BSc. (Hons) Applied Life Sciences with Agrochemicals and Pest Management

Swami Shraddhanand College

#### DISCIPLINE SPECIFIC CORE COURSE – 01

#### 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		
<b>Agrochemicals for Insect and Mite Control: DSC 07</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	-	<b>NIL</b>

#### Course objectives

The Learning Objectives of this course are as follows:

- to familiarize students to different types of classification of pesticides.
- to familiarize with factors that make the organic compound to be considered as pesticide.
- Develop a solid knowledge base regarding the chemistry, classification, and synthesis of agrochemicals—including insecticides and acaricides (pesticides used against mites).
- This entails learning about key chemical classes (such as organophosphates, pyrethroids, carbamates) and their modes of action and effective chemical control strategies

#### Learning outcomes

The Learning Outcomes of this course are as follows:

- To analyze important aspects attributing pesticidal activity to organic molecules.
- To explain the strategies involved in synthesis of different pesticides.
- To handle pesticides safely in view of human health and environment.
- To help the students to gain an in-depth understanding of both the theoretical and practical aspects of using agrochemicals for pest management

## **SYLLABUS OF DSC- 07**

### **THEORY COMPONENT-**

#### **UNIT 1:**

**(17 Hours)**

**A** Structure, properties, uses, structure-activity relationship (QSAR) and toxicity with reference to selective examples each from class of selected examples of pesticides:

Discussion on stereochemical aspects of pesticides insecticides, where ever required.

- a) Organochlorines
- b) Organophosphorus
- c) Carbamates

**B** Structure, uses and toxicity examples each from:Pyrethrins,Pyrethroidsand Neonicotinoids. Discussion on stereochemical aspects of pesticides insecticides, where ever required.

- a) Pyrethrins
- b) Synthetic Pyrethroids
- c) Neonicotinoids pesticides

#### **UNIT 2:(10Hours)**

**Introduction to Insecticide synergists:**Concept, Significance, andimportance,role in resistance management,mode of action,Common insecticide synergists-piperonylbutoxide and MGK-264 (n-octylbicycloheptanedicarboximide), Synergists Work Efficacy, Resistance Management, Reduced Insecticide Use

#### **UNIT3:**

**(10 Hours)**

Introduction to Synthetic IGRs:Synthetic IGRs- Concept, Significance, andimportance, **Use of Synthetic IGRs-** Mimicking Hormones, Disrupting Chitin Synthesis, targeting Specific Life Stages,

**Advantages of Synthetic IGRs** - Reduced Environmental Impact, Reduced Resistance Development, Compatibility with Integrated Pest Management (IPM),

**Examples of Synthetic IGRs:** Methoprene, Diflubenzuron, teflubenzuronChlorfluazuron ,Fenoxycarb

#### **UNIT4:**

**(8 Hours)**

Fumigants and other chemicals for post-harvest storage of agricultural commodities

**Synthesis of pesticides /analogues/intermediates**

1. Preparation of carbamate derivative from phenylisocyanate and alcohol/phenol.
2. Preparation of DDT from chlorobenzene and chloral
3. Preparation of other chlorinated hydrocarbons DDE, and Methoxychlor
4. Preparation of organophosphorus Insecticide-Part A -phosphorodichloridite, and Part B -phosphonate
5. Preparation and characterization of oxime ether, Preparation of DDVP.
6. Preparation of acyl phenyl hydrazine
7. Preparation of 3,5-dimethylpyrazole
8. Preparation of mosquito repellent Diethyl phthalate in two steps:
  - Step-1: Preparation of phthalic anhydride
  - Step-2: preparation of Diethyl phthalate
9. Writing the assigned an in-depth analysis of at least three insecticides to be allotted by instructor from organochlorines, organophosphorus, carbamates, pyrethroids, and neonicotinoids. It must cover the detailed aspects of: Chemical Structure, Uses, Mode of Action, Toxicity and GHS labelling, Human Health Implications

## ESSENTIAL/RECOMMENDED READINGS

1. G.T. (1976). *Chlorinated Insecticides* (Vols. I–II). CRC Press.
2. Buchel, K. H. (Ed.). (1992). *Chemistry of Pesticides*. John Wiley & Sons.
3. Cremllyn, R. J. (1990). *Pesticides: Preparation and Mode of Action*. Wiley.
4. Eto, M. (1979). *Organophosphorus Pesticides: Organic and Biological Chemistry*. CRC Press. (Note: Corrected to insert a space between “Biological” and “Chemistry”.)
5. Kuhr, R. J., & Dorough, H. W. (1979). *Carbamate Insecticide Chemistry and Biochemistry*. CRC Press.
6. Leahey, J. P. (1985). *The Pyrethroid Insecticides*. Taylor & Francis.
7. Metlosky, G., Nadasy, M., & Andriska, V. (1988). *Pesticide Chemistry*. Elsevier.
8. Perry, U. K., Yamamoto, A. S., Ishaaya, I., & Perry, R. (1998). *Insecticides in Agriculture and Environment: Retrospects and Prospects*. Narosa.

**KEYWORDS:** QSAR, Stereochemical activity of Pesticides, Insecticide synergists, Synthetic synergists, Fumigants, Pesticide activity

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