

## SEMESTER –VIII

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

Swami Shraddhanand College

#### DISCIPLINE SPECIFIC CORE COURSE – 02

#### 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>Agrochemical for Fungi, Nematodes, and Weeds: DSC 08</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:

- Learners will gain knowledge about agrochemicals used for the control of fungi, nematodes and weeds.
- To study interactions of fungi, nematodes, and weed species in agricultural systems.
- To understand how these organisms, affect crop health and yield.
- Understand the biochemical and physiological mechanisms by which these chemicals control pest populations.

#### Learning outcomes

The Learning Outcomes of this course are as follows:

- Articulate the modes of action for various agrochemical agents and explain how these mechanisms disrupt the life processes of pests.
- Develop strategies for minimizing adverse effects through careful selection, timing, and application of agrochemicals.
- Learners will explain, compare, and critically assess the major classes of agrochemicals (fungicides, nematicides, and herbicides) and their specific modes of action.

## **SYLLABUS OF DSC- 08**

### **THEORY COMPONENT-**

#### **A. FUNGICIDES**

##### **UNIT 1: (16Hours)**

Preparation, properties, uses, structure-activity relationship and mode of action of selected fungicides: Organophosphorus compounds and dithiocarbamates Polyhalogenalkanes, sulfenyl compounds, phenols, quinones, carboxamides, carboximides.

Preparation, properties, uses, structure-activity relationship and mode of action of Azoles and other heterocyclics compounds as fungicides.

##### **UNIT 2: (8 Hours)**

A comprehensive view, with reference to two suitable examples of fungicides, for each of the following Mode of action

- a) Membrane sterol biosynthesis
- b) Lipid synthesis, transport, or membrane function
- c) Respiration inhibitor
- d) Nucleic acid metabolism

#### **B. NEMATOCIDES**

##### **UNIT 3:(6 Hours)**

Preparation, properties, uses and mode of action of selected Nematicides: halocarbons, organophosphorus compounds, carbamates.

#### **C. HERBICIDES**

##### **UNIT 4: (15Hours)**

Properties, uses, structure-activity relationship and mode of action of phenoxyalkanoic acids, carbamates and substituted phenylureas, sulfonylureas

Properties, uses, structure-activity relationship and mode of action of triazines, pyridinium compounds, imidazolinones and dinitroanilines.,

Herbicide safeners and Synthetic plant growth regulators

A comprehensive view, with reference to suitable examples of herbicides, for each of the following Mode of action

- a) Inhibition of Photosynthesis at PS II and PSI
- b) Inhibition of Cellulose Synthesis
- c) Inhibition of Microtubule Assembly

## PRACTICAL COMPONENT

(30Hours)

### Synthesis of pesticides /analogues/intermediates

1. Preparation of 2,4-dichlorophenoxy acetic acid herbicide or its synthetic analogues  
(*any one* of the following)
  - a) 4-chlorophenoxy acetic acid
  - b) 4-methylphenoxy acetic acid
  - c) 2-methylphenoxy acetic acid
2. Preparation of ethyl ester or butyl ester of any one of phenoxy acetic acid mentioned in experiment-1.
3. Preparation of 2-naphthoxyacetic acid (BNOA or  $\beta$ -naphthoxyacetic acid)
4. Preparation of Dithiocarbamate fungicide analogous from aromatic/aliphatic amine and separated as sodium /zinc/ manganese salt.
5. Preparation of Zineb (Z)
6. Preparation of urea derivative from phenylisocyanate and aniline.
7. Preparation of thiourea derivative from phenylisothiocyanate and aniline.
8. Preparation of benzimidazole/2-benzylimidazole /2-Methylbenzimidazole
9. Preparation of Maleic anhydride -an intermediate for agrochemicals
10. Writing the assigned an in-depth analysis of at least three fungicides /Nematicide/Herbicides to be allotted by the instructor. It must cover the detailed aspects of: Chemical Structure, Uses, Mode of Action, Toxicity and GHS labelling, Human Health Implications.

### ESSENTIAL/RECOMMENDED READINGS

1. Audus, L.J. (1964), The Physiology and Biochemistry of Herbicides, Academic Press.
2. Bell, C.V. and Alford, D.V. (2000), \_Pest and Disease Management Handbook, British Crop Protection Council; Wiley-Blackwell
3. Buchel, K.H. (Ed.) (1992), Chemistry of Pesticides, John Wiley & Sons
4. Copping, L.G., Hewitt, H.G. and Leonard, G.C. (1998), Chemistry and Mode of Action of Crop Protection Agents, Royal Society of Chemistry.

5. Cremllyn, R.J. (1990), Pesticides: Preparation and Mode of Action, John Wiley & Sons, U.K
6. Kearnay, P.C. and Kaufman, D.D. (1975), Herbicides: Chemistry, Degradation and Mode of Action\_ (Vols. I, II), Marcel Dekker.
7. Kramer, W.K. and Ulrich, S. (2007), Modern Crop Protection Compounds, Wiley-VCH Verlag GmbH
8. Metlosky, G.,Nadasy, M. and Andriska, V. (1988), Pesticide Chemistry, Elsevier
9. Nene, Y.L. and Thapliyal, P.N. (1989), Fungicides in Plant Disease Control, India Book House
10. Roy, N.K. (2002), Chemistry of Pesticides, CBS Publishers, New Delhi.
11. Unger, T.A. (1996), Pesticide Synthesis Hand Book, William Andrew.
12. Vyas, S.C. (1984),Handbook of Systemic Fungicides, Tata McGraw Hill.

**KEYWORDS:** Fungicides, mode of action of fungicides, Nematicides, mode of action of herbicides, Herbicide safeners, Synthetic plant growth regulators

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