

# 21ENTO231 FUNDAMENTALS OF ENTOMOLOGY II

## (INSECT ECOLOGY & CONCEPTS OF IPM)

Hours Per Week :

L	T	P	C
1	-	2	2

Total Hours :

L	T	P
15	-	30



Source :

<https://content.ces.ncsu.edu/extension-gardener-handbook/8-integrated-pest-management-ipm>

### COURSE DESCRIPTION AND OBJECTIVES:

This course familiarizes the students with the concept of IPM, properties, classification and formulations of insecticides and recent methods of pest control

### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Students will learn about Insect Ecology: Introduction, Environment and its components
2	Capacity to empower the farmers on the safe use of insecticides and advise on effective management of insect pests using IPM approach
3	Able to conduct surveillance and alert or forewarn farmers about the potential damage from insect pests and on measures to control the same

### SKILLS:

- ✓ *Design Integrated Pest Management modules for insect pests*
- ✓ *Identify most vulnerable growth stage of pest population to implement suitable pest management practice*
- ✓ *Practice pest management practices*
- ✓ *Identify harmful and beneficial insects*
- ✓ *Mass multiplication of parasitoids and predators*

**ACTIVITIES:**

- o *Demonstrate Sampling techniques for the estimation of insect population and damage*
- o *Calculate doses/ concentrations of different insecticidal formulations and demonstrate application methods*
- o *Establish lab for mass multiplication of important insect predators, parasitoids and pathogens and demonstrate mass multiplication techniques*
- o *Visit commercial labs those are multiplying the entomopathogens and insect predators and parasitoids*

**UNIT - 1**

**Insect Ecology:** Introduction, Environment and its components. Effect of abiotic factors temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents

**UNIT - 2**

**Effect of biotic factors** – food competition, natural and environmental resistance. Concepts of Balance of life in nature, biotic potential and environmental resistance and causes for outbreak of pests in agro-ecosystem. Hardy-Weinberg equilibrium in insects

**UNIT - 3**

**Pest surveillance and pest forecasting.** Crop health monitoring through remote sensing (drones and satellites). Categories of pests. IPM Concepts. Host plant resistance incl. Bttransgenic crops, components / Tools of IPM: Cultural, Mechanical, Physical, Chemical, Legislative, Biological (Important parasites, predators, transgenic plants, pathogens such as bacteria, fungi, EPNs and viruses). Introduction to new tools (machine learning based tools for pest management, pest diagnostics, hand held devices for data recording *etc*). Insect resistance to different control methods, resistance monitoring, and its management

**UNIT - 4**

**Methods of control:** Chemical control-importance, hazards and limitations. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Recent methods of pest control, repellents, antifeedants, hormones, attractants, gamma radiation and genetic control (GM insect programs such as RIDL technology)

**UNIT - 5**

**Insecticides Act 1968**-Important provisions. The Pesticide Management Bill 2020. Application techniques of spray fluids. Phytotoxicity of insecticides. Symptoms of poisoning, first aid and antidotes. Safety precautions while applying chemicals (incl. use of eye/skin protection and PPEs). Mode of action labelling, label claims and insecticide resistance action committee (IRAC)

**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS**

1. Sampling techniques for the estimation of insect population in different crops
2. Study of distribution patterns of insects in crop ecosystems
3. Techniques for the estimation of insect damage in different crops
4. Pest surveillance through light traps, sticky traps, pheromone traps and forecasting of pest incidence
5. Pesticide formulations – new formulations and formulation technologies.
6. Calculation of spray volume required/ doses/ concentrations of different insecticidal formulations
7. Compatibility of pesticides with other agrochemicals and phytotoxicity of insecticides
8. Acquaintance of mass multiplication techniques of important predators – *Cryptolaemus*.

9. Acquaintance of mass multiplication techniques of the egg parasitoid, *Trichogramma*
10. Acquaintance of mass multiplication techniques of *Apanteles* sp. (Larval) and *Tetrastichus* sp. (Pupal) parasitoids
11. Acquaintance of mass multiplication techniques of the Entomopathogenic fungus, *Beauveria bassiana*
12. Acquaintance of mass multiplication techniques of Ha NPV and SI NPV
13. Study of insect pollinators, weed killers and scavengers
14. Identification of different rodent pests
15. Identification of different non-insect pests viz., birds, crabs, snails and slugs; different household and veterinary insect pests

#### REFERENCES:

1. Vasantharaj David, B. and Rama Murthy V.V. 2016. *Elements of Economic Entomology* Popular Book Depot, Coimbatore
2. Atwal, A. S. and Bains, S.S. 1989. *Applied Animal Ecology*. Kalyani Publishers, New Delhi
3. Vasantharaj David, B and Aanathakrishnan, T.N. 2006. *General and Applied Entomology*. Tata McGraw-Hill Publishing House, New Delhi
4. Metcalf, R.L. and Luckman, W.H. 1982. *Introduction to Insect Pest Management*. Wiley Inter Science Publishing, New York
5. Yazdani, S.S. and Agarwal, M.L. 1979. *Elements of Insect Ecology*. Narosa Publishing House, New Delhi
6. Dhaliwal, G.S. and Ramesh Arora 2001. *Integrated Pest Management: Concepts and Approaches*, Kalyani Publishers Ludhiana

