

21PATH373 PRINCIPLES OF INTEGRATED PEST AND DISEASE MANAGEMENT

Hours Per Week :

L	T	P	C
1	-	4	3

Total Hours :

L	T	P
15	-	60



Source:

<https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=28210>

Course Description and Objectives:

To acquaint students with various pest and disease management methods, safe use of pesticides and promoting integrated pest management strategies

Course Outcomes:

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

COs	Course Outcomes
1	Plan surveillance and forecasting of insect pests and diseases
2	Students will learn prevention and control measures during the disease spread, disease cycle and integrated pest managements in cereal and millet, major oil crops, legumes and other miscellaneous crops
3	Assess the level of economic impact of pests and diseases in different crops and manage them using advanced eco-friendly and sustainable integrated pest management practices

SKILLS:

- ✓ Identify casual organisms for the pests and diseases of different crops
- ✓ Develop Integrated Pest and Disease Management models indifferent crop
- ✓ Calculate cost of plant protection measures

ACTIVITIES:

- o *Field visit for detection and diagnosis of various insect pests and plant diseases by different methods*
- o *Assessment of crop yield losses by different methods*
- o *Monitor and estimation of pest population*
- o *Depth knowledge on ETL and EIL concepts*
- o *Mass multiplication of Bio-control agents*

UNIT - 1

Introduction:– Survey, Data recording and assessment of important plant diseases; Principles of Integrated disease management by cultural rouging, eradication of alternate and collateral host, manure and fertilizer management, mixed cropping, sanitation, summer ploughing, time of sowing, seed rate and plant density, irrigation and drainage, crop rotation, fallowing, soil amendments), physical (Soil solarisation, hot water treatment), biological (Biopesticides, organic amendments and botanicals), chemical (fumigants, non-fumigants); Synthesis and development of IPM modules; Total system approach; Subsystem of IPM; IPM strategies, Integration of practices, Benefits and limitations; Organic farming system; cost, benefit ratio; Planning, on-farm validation and promotion of IDM in Rice, Groundnut, Cotton and Chillies, Mango, Banana, Citrus and Brinjal; Political, social, and legal implications of IDM; Case histories of important IDM programs, vegetables and pulses

UNIT - 2

Seed Health: Principles and procedures of healthy seed production; seed health testing - methods for detecting micro-organisms from seed; Production of toxic metabolites affecting seed quality and its impact on human, animal and plant health

UNIT - 3

Fungicides: Introduction to conventional and new generation fungicides; Classification of fungicides based on chemical group and antibiotics with examples. Bio-assay of fungicides; Methods of application; Environmental pollution; phyto-toxicity; residual effects; health hazards; safety measures; fungicidal resistance; Foliage, seed, soil application of chemicals, role of stickers, spreaders, Mode of action of antifungal, antibacterial and antiviral chemicals; Precautions while using, storage; Compatibility with other chemicals

UNIT - 4

Biological control: Biocontrol organisms – mechanisms of biocontrol – examples - mass multiplication methods. Biological control - merits and demerits; Evaluation of Bio-agents; Bio - pesticides available in the market; preparation of leaf extracts, oil emulsion of neem

UNIT - 5

Host plant resistance: Disease resistance in plants; advantages; Flor's gene for gene hypothesis – types of resistance vertical and horizontal resistance – mechanism of resistance; Cross protection; Methods for screening disease resistance; Disease indexing for early detection of virus diseases; Biotechnological approach in plant disease management through tissue culture - transgenic plants; Plant quarantine, Bio safety and certification procedures

LABORATORY EXPERIMENTS**LIST OF EXPERIMENTS**

1. Identification of plant diseases based on symptoms and signs
2. Familiarization with plant protection equipment and their safe use
3. Weather data collection and correlation with the prevailing diseases
4. Assessment of diseases – grading, score chart – disease index. Plotting AUDP curves.
5. Screening of varieties for resistance to plant disease

6. Disease indexing for early detection of virus diseases
7. Familiarization with Biopesticides available in the market
8. Preparation of Bordeaux mixture, Bordeaux paste and cheshunt compound, phytotoxicity of fungicides
9. Preparation of fungicidal spray solutions- methods of application of fungicides – Calculation of fungicide spray concentrations based on active ingredients- foliar application and soil drenching; Seed treatment; Root feeding, post harvest treatment
10. Preparation of Panchagavya, Bijamrita, Panchapatrakashayam and other botanical extracts
11. Incubation of *Trichoderma* in Farm yard manure for field application
12. Seed health testing: seed germination tests, calculation of germination loss due to pests
13. Isolation and Identification of seed borne fungi, bacteria, virus
14. Bio-assay of fungicides – poisoned food technique, inhibition zone technique and slide germination technique
15. Bio-control of plant pathogens – dual culture technique and *in-vitro* testing
16. Mass multiplication of biocontrol agents : *Trichoderma* and *Pseudomonas*
17. Solarisation for management of soil borne pathogens; Demonstration of physical methods for crop disease management
18. Preparation and application of botanicals
19. Successful Farmers Field visits, case studies of organic farming and integrated pest management
20. Visit to Plant Quarantine Station, Remote sensing laboratory and Tissue culture laboratory
21. IDM and non IDM methods – Cost Benefit Analysis – Case studies
22. Awareness of IDM campaign at farmers fields
23. Development of IDM of any one disease of field / vegetable / horticultural crops (practical assignment)
24. Methods of diagnosis and detection of various insect pests
25. Identification, nature of damage and dynamics of important insect pests and their management in different major crop ecosystems (paddy, maize, cotton, sugarcane, groundnut, castor, mango, citrus, coconut, brinjal and tomato)
26. Agro Eco System Analysis in major field crops (paddy and cotton); Ecological engineering for rice
27. Methods of assessment of insect pests population, damage and crop yield losses and calculation of cost benefit ratios (paddy/cotton)
28. Identification of natural biocontrol agents in different crop ecosystems
29. Planning and assessment of insect pest preventive strategies (IPM module) and decision making
30. Mass multiplication of *Trichogramma* egg parasitoids; Mass multiplication of NPVs

REFERENCES:

1. Dhaliwal, G. S. and Ramesh Arora, 2001. *Integrated pest management: Concepts and approaches*, Kalyani Publishers Ludhiana
2. Nene, Y.L. and Thapliyal, P.N. 1998. *Fungicides in Plant Disease Control*. Oxford and IBH New Delhi
3. Agrios, G.N. 2005. *Plant Pathology*. Academy Press. New York
4. Gupta, V. K. and Sharma, R.C. 2011. *Integrated Disease Management and Plant Health*. Scientific Publishers
5. Maloy, O.C. 1993. *Plant Disease control. Principles and Practice*. John Wiley and Sons. Inc, New York
6. Prakasam, V. Reguchander, T. and Prabakar, K. 1998. *Plant diseases management*. A.E. Publication, Coimbatore