

**Department of Entomology
Faculty of Agricultural Sciences
University of the Punjab, Lahore
Course Outline**



Programme	B.Sc. (Hons) Agriculture (Major: Entomology)	Course Code	ENT-404	Credit Hours	3 (2-1)
Course Title	PLANT RESISTANCE TO INSECT PESTS				
Course Introduction					
<p>This course aims to provide concepts of plant resistance against insects. This course discusses the characters of plants and different factors mediating resistance against insect pests. The students will get familiarized by the basic understanding of factors of plant resistance against insects, the mechanisms of resistance such as ecological or induced plant resistance, antixenosis and tolerance mechanisms in the plants. Moreover, genetic basis of the plant resistance and environmental influence of plant resistance mechanisms will be described and demonstrated to students.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will have gained the ability to:</p> <ol style="list-style-type: none"> 1. Understand the mechanism of plant resistance against insects. 2. Role of plant morphological and physiological features in plant resistance against insect pests. 3. Understand the role of entomologist in breeding of crops. 					
Course Content (Theory)					Assignments/Readings
Week 1	Unit-I				
	1.1.Introduction to plant resistance to insect pests				
	1.2.History and importance of resistance, principles, classification, components, types and mechanisms of resistance.				
Week 2	Unit-II				Assignment 1: List the major steps involved in the insect / plant interactions.
	2.1. History and importance of resistance, principles, classification, components, types and mechanisms of resistance. (cont.....)				
	2.2. History and importance of resistance, principles, classification, components, types and mechanisms of resistance. (cont.....)				
Week 3	Unit-III				
	3.1. Insect-host plant relationships; theories and basis of host plant selection in phytophagous insects				
	3.2. The mechanism of resistance in plant against insects				

Week 4	Unit-IV 4.1. The mechanism of resistance in plant against insects (cont.....)	
	4.2. The mechanism of resistance in plant against insects (cont.....)	
Week 5	Unit-V 5.1. Chemical ecology, tritrophic relations, volatiles and secondary plant substances; basis of resistance. Induced resistance - acquired and induced systemic resistance.	Assignment 2: Deliberate the potential of HPR in IPM
	5.2. Chemical ecology, tritrophic relations, volatiles and secondary plant substances; basis of resistance. Induced resistance - acquired and induced systemic resistance (cont.....)	
Week 6	Unit-VI 6.1. Chemical ecology, tritrophic relations, volatiles and secondary plant substances; basis of resistance. Induced resistance - acquired and induced systemic resistance (cont.....)	
	6.2. Chemical ecology, tritrophic relations, volatiles and secondary plant substances; basis of resistance. Induced resistance - acquired and induced systemic resistance (cont.....)	
Week 7	Unit-VII 7.1. Ecological resistance in plants against insects	
	7.2. Physiological resistance in plants against insects	
Week 8	Unit-VIII 8.1. Induced genetic resistance in plants	
	8.2. Antixenosis, antibiosis and tolerance of plants against insects	
Week 9	MIDTERM EXAM	
Week 10	Unit-IX 9.1. Factors affecting plant resistance including biotypes and measures to combat them	
	9.2. Genetic basis of plant resistance against insects	
Week 11	Unit-X 10.1. Effect of environment on plant resistance	
	10.2. Biotypes of insects	

Week 12	Unit-XI 11.1. Screening techniques; breeding for insect resistance in crop plants; exploitation of wild plant species; gene transfer, successful examples of resistant crop varieties in world.	
	11.2. Screening techniques; breeding for insect resistance in crop plants; exploitation of wild plant species; gene transfer, successful examples of resistant crop varieties in world (cont.....)	
Week 13	Unit-XII 12.1. Role of biotechnology in plant resistance to insects.	
	12.2. Measurement of resistance in plants against insects	
Week 14	Unit-XIII 13.1. Development of insect resistant varieties	
	13.2. The role of entomologist in breeding for resistance and transgenic crops	
Week 15	Unit-XIV 14.1. The role of entomologist in breeding for resistance and transgenic crops (cont.....)	
	14.2. Successful Uses of Insect Resistant Cultivars	
Week 16	Unit-XV 15.1. Potential and Limitations of Host Plant Resistance	
	15.2. Potential and Limitations of Host Plant Resistance (cont.....)	
Course Content (Practical)		Assignments/Readings
Week 1	Testing of relative cotton characters causing resistance to insects	
Week 2	Testing of relative sugarcane characters causing resistance to insects	
Week 3	Testing and measurement of relative rice characters causing resistance to insects	
Week 4	Testing and measurement of relative maize characters causing resistance to insects	
Week 5	Testing and measurement of relative pulses seeds characters causing resistance to insects	
Week 6	Testing and measurement of relative oil seeds characters causing resistance to insects	
Week 7	Testing and measurement of relative Citrus characters causing resistance to insects	
Week 8	Testing and measurement of relative Fruits characters causing resistance to insects	

Week 9	MIDTERM EXAM	
Week 10	Testing and measurement of relative Vegetables characters causing resistance to insects	
Week 11	Screening techniques for measuring resistance	
Week 12	Measurement of plant characters and working out their correlations with plant resistance	
Week 13	Bioassay of plant extracts of susceptible/resistant varieties	
Week 14	Demonstration of antibiosis, tolerance and antixenosis	
Week 15	Successful Uses of Insect Resistant Cultivars under laboratory condition	
Week 16	Successful Uses of Insect Resistant Cultivars under field condition	

Textbooks and Reading Material

1. Panda, N., & Khush, G.S. (1995). Host Plant Resistance to Insects, Guildford, UK: IRRI, Printed and Bound in UK, Biddles Ltd.
2. Pedigo, L.P. (1996). Entomology and Pests Management (2nd ed.). London: Prentice Hall.
3. Dhaliwal, G.S., & Singh R. (2005). Host Plant Resistance to Insects. New Delhi: Panima Publishing Corporation.
4. Panda, N. (1980). Principles of Host Plant Resistance to Insect Pests. Allenheld, London: Packard Publishing.
5. Sadasaban, S., & Thayumanayan, B.(2003). Molecular Host Plant Resistance to Pests. USA: CRC Press.
6. Maxwell, F.G. and Jennings, P.R. 1980. Breeding Plants Resistant to Insect Pests. John Wiley and Sons New York.
7. Pedigo, L.P. 2007. Entomology and Pests Management, 5thEd. Prentice Hall, Inc, London
8. Sadasivam, S. and Thayumanavan, B. 2003. Molecular Host Plant Resistance to Pests. Marcel Dekker Inc. New York.

Note:

1. It is preferable to use latest available editions of books. Mention the publisher & year of publication.
2. The References/ bibliography may be in accordance with the typing manual of the concerned faculty/subject. Preferably follow APA 7th Edition publication manual.

Teaching Learning Strategies

1. Multimedia
2. White Board
3. Group discussion
4. Quiz/Assignments
5. Demonstration/Activity

Assignments: Types and Number with Calendar

1. Discuss the essential pre-requisites for an effective breeding programme (Mid-term)
2. Discuss role of Allelochemicals in HPR

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.