Syllabus

PHDENT605: Bio-inputs for Pest Management (2+1)

Course Code	Course Name	TEACHING & EVALUATION SCHEME							
		THEORY			PRACTICAL		L	P	CREDITS
		END SEM University Exam	Two term exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*			
PHDENT605	Bio-inputs for Pest Management	60	00	40	30	20	2	1	3

Legends: L - Lecture; **P** – Practical;

*Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class etc.

Aim of the course

To appraise the students with advanced techniques in handling of different bioagents, modern methods of biological control and scope in cropping system-based pest management in agro-ecosystems.

Theory

Unit I

Scope of classical biological control and augmentative bio-control; introduction and handling of natural enemies; nutrition of entomophagous insects and their hosts.

Unit II

dynamics of bio-agents vis-à-vis target pest populations. Bio-inputs: mass production of bio-pesticides, mass culturing techniques of bioagents, insectary facilities and equipments,

Unit III

Basic standards of insectary, viable mass-production unit, designs, precautions, good insectary practices. Colonization, techniques of release of natural enemies, recovery evaluation, conservation and augmentation of natural enemies.

Unit IV

Survivorship analysis and ecological manipulations, large-scale production of bio-control agents, bankable project preparation. Scope of genetically engineered microbes and parasitoids in biological control,

Unit V

Genetics of ideal traits in bio-control agents for introgressing and for progeny selections, breeding techniques of bio-control agents.

Practical

• Mass rearing and release of some commonly occurring indigenous natural enemies;

• Assessment of role of natural enemies in reducing pest populations; • Testing side effects of pesticides on natural enemies;

• Effect of semio-chemicals on natural enemies, breeding of various bio-control agents, performance of efficiency analyses on target pests;

• Project document preparation for establishing a viable mass-production unit/ insectary;

• Observation of feeding behavior acts of predatory bugs/ beetles

Suggested Readings

Burges HD and Hussey NW. (Eds.). 1971. Microbial Control of Insects and Mites. Academic Press, London.

Coppel HC and James WM. 1977. Biological Insect Pest Suppression. Springer Verlag, Berlin.

De Bach P. 1964. Biological Control of Insect Pests and Weeds. Chapman and Hall, London.

Dhaliwal, GS and Koul O. 2007. Biopesticides and Pest Management. Kalyani Publishers, New Delhi.

Gerson H and Smiley RL. 1990. Acarine Biocontrol Agents – An Illustrated Key and Manual. Chapman and Hall, New York.

Huffakar CB and Messenger PS. 1976. Theory and Practices of Biological Control. Academic Press, London.

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PHDENT606 Insect Toxicology and Residues 2+1

Course Code	Course Name	TEACHING & EVALUATION SCHEME							
		THEORY			PRACTICAL		L	P	CREDITS
		END SEM University Exam	Two term exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*			
PHDENT606	Insect Toxicology and Residues	60	00	40	30	20	2	1	3

Legends: L - Lecture; **P** – Practical;

*Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class etc.

Aim of the course:

To acquaint the students with the latest advancements in the field of insecticide toxicology, biochemical and physiological target sites of insecticides, and pesticide resistance mechanisms in insects.

Theory

Unit I

Penetration and distribution of insecticides in insect systems; insecticide selectivity; factors affecting toxicity of insecticides. Modes of action of newer insecticide molecules; developments in bio-rational approaches; SPLAT; RNAi technology for pest management.

Unit II

Biochemical and physiological target sites of insecticides in insects; developments in biorationals, biopesticides and newer molecules; their modes of action and structural – activity relationships; advances in metabolism of insecticides.

Unit III

Joint action of insecticides; activation, synergism and potentiation.

Unit IV

Problems associated with pesticide use in agriculture: pesticide resistance; resistance mechanisms and resistant management strategies; pest resurgence and outbreaks; persistence and pollution; health hazards and other side effects.

Unit V

Estimation of insecticidal residues- sampling, extraction, clean-up and estimation by various methods; maximum residue limits (MRLs) and their fixation; bound and conjugated residues, effect on soil fertility; insecticide laws and standards, and good agricultural practices.

Practical

- Residue sampling, extraction, clean-up and estimation of insecticide residues by various methods;
- Calculations and interpretation of data;
- Biochemical and biological techniques for detection of insecticide resistance in insects;
- Preparation of EC formulation using neem oil.

Suggested Reading

Busvine JR. 1971. A Critical Review on the Techniques for Testing Insecticides. CABI, London.

Dhaliwal GS and Koul O. 2007. Biopesticides and Pest Management. Kalyani Publishers, New Delhi.

Hayes WJ and Laws ER. 1991. Handbook of Pesticide Toxicology. Academic Press, New York.

Ishaaya I and Degheele (Eds.). 1998. Insecticides with Novel Modes of Action. Narosa Publ. House, New Delhi.

Matsumura F. 1985. Toxicology of Insecticides. Plenum Press, New York.

O' Brien RD. 1974. Insecticides Action and Metabolism. Academic Press, New York.

Perry AS, Yamamoto I, Ishaaya I and Perry R. 1998. Insecticides in Agriculture and Environment. Narosa Publ. House, New Delhi.

Prakash A and Rao J. 1997. Botanical Pesticides in Agriculture. Lewis Publ., New York.

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PHDPLPATH604 Molecular Basis of Host-pathogen Interaction 2+1

Course code	Course Name	TEACHING & EVALUATION SCHEME							
		THEORY			PRACTICAL		L	P	CREDITS
		END SEM University Exam	Mid Term Exam	Teachers Assessment*	END SEM University Exam	Teacher's Assessment*			
PHDPLPATH604	Molecular Basis of Host-pathogen Interaction	60	00	40	30	20	2	1	3

Legends: L - Lecture; **P** – Practical;

*Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class etc.

Aim of the course:

To understand the concepts of molecular biology and biotechnology in relation to host plant-pathogen interactions.

Theory

Unit I

History of host plant resistance and importance to Agriculture. Importance and role of biotechnological tools in plant pathology. Basic concepts and principles to study host pathogen relationship. Molecular genetics, imaging and analytical chemistry tools for studying plants, microbes, and their interactions.

Unit II

Different forms of plant-microbe interactions and nature of signals/ effectors underpinning these interactions. Plant innate immunity: PAMP/ DAMP. Molecular basis of host-pathogen interaction-fungi, bacteria, viruses and nematodes; recognition system, signal transduction.

Unit III

Induction of defence responses- HR, Programmed cell death, reactive oxygen species, systemic acquired resistance, induced systemic resistance, pathogenesis related proteins, phytoalexins and virus induced gene silencing. Molecular basis of genefor-gene hypothesis; R-gene expression and transcription profiling, mapping and cloning of resistance genes and marker-aided selection, pyramiding of R genes.

Unit IV

Gene for gene systems: Background, genetics, phenotypes, molecular mechanisms, races, breakdown of resistance (boom-and-bust cycles), Coevolution-arms race and trench warfare models, Metapopulations, cost of resistance, cost of unnecessary virulence, GFG in agricultural crops vs. natural populations, Durability of resistance, erosion of quantitative resistance. Pathogen population genetics and durability, viruses vs cellular pathogens.

Unit V

Gene deployment, cultivar mixtures. Disease emergence, host specialization. Circadian clock genes in relation to innate immunity. Biotechnology and disease management; development of disease resistance plants using genetic engineering approaches, different methods of gene transfer, biosafety issues related to GM crops.

Practical

• Protein, DNA and RNA isolation, plasmid extraction, PCR analysis, DNA and Protein electrophoresis, bacterial transformation;

• Gene mapping and marker assisted selection;

• Development and use of molecular markers in identification and characterization of resistance to plant pathogens and their management.

Suggesting Reading

Chet I. 1993. Biotechnology in Plant Disease Control. John Wiley & Sons, New York.

Gurr SJ, McPohersen MJ and Bowlos DJ. (Eds.). 1992. Molecular Plant Pathology – A Practical Approach. Vols. I & II, Oxford Univ. Press, Oxford.

Mathew JD. 2003. Molecular Plant Pathology. Bios Scientific Publ., UK.

Ronald PC. 2007. Plant-Pathogen Interactions: Methods in Molecular Biology. Humana Press, New Jersey.

Stacey G and Keen TN. (Eds.). 1996. Plant Microbe Interactions. Vols. I-III. Chapman & Hall, New York; Vol. IV. APS Press, St. Paul, Minnesota.

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PHDSTAT522 Data Analysis Using Statistical Packages 2+1

Course Code	Course Name	TEACHING & EVALUATION SCHEME							
		THEORY			PRACTICAL		L	P	CREDITS
		END SEM University Exam	Two term exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*			
PHDSTAT522	Data Analysis Using Statistical Packages	60	00	40	30	20	2	1	3

Legends: L - Lecture; **P** – Practical;

*Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class etc.

Objective

This course is meant for exposing the students in the usage of various statistical packages for analysis of data. It would provide the students a hands on experience in the analysis of their research data. This course is useful to all disciplines.

Theory

Unit I

Introduction to various statistical packages: Excel, R, SAS, SPSS. Data Preparation; Descriptive statistics; Graphical representation of data, Exploratory data analysis.

Unit II

Test for normality; Testing of hypothesis using chi-square, t and F statistics and Z-test.

Unit III

Data preparation for ANOVA and ANCOVA, Factorial Experiments, contrast analysis, multiple comparisons, Analyzing crossed and nested classified designs.

Unit IV

Analysis of mixed models; Estimation of variance components; Correlation and regression analysis, Probit, Logit and Tobit Models.

Unit V

Discriminant function; Factor analysis; Principal component analysis; Analysis of time series data, Fitting of non-linear models; Neural networks.

Practical

• Use of software packages for summarization and tabulation of data, obtaining descriptive statistics, graphical representation of data;

• Testing the hypothesis for one sample t-test, two sample t-test, paired t-test, test for large samples - Chi-squares test, F test, one-way analysis of variance;

• Designs for Factorial Experiments, fixed effect models, random effect models, mixed effect models, estimation of variance components;

• Linear regression, Multiple regression, Regression plots;

• Discriminant analysis - fitting of discriminant functions, identification of important variables;

• Factor analysis. Principal component analysis - obtaining principal component.

Suggested Readings

• Anderson C.W. and Loynes R.M. 1987. The Teaching of Practical Statistics. John Wiley.

• Atkinson A.C. 1985. Plots Transformations and Regression. Oxford University Press.

• Chambers J.M., Cleveland W.S., Kleiner B and Tukey P.A. 1983. Graphical Methods for Data Analysis. Wadsworth, Belmount, California.

• Chatfield C. 1983. Statistics for Technology. 3rd Ed. Chapman & Hall. Chatfield C. 1995. Problem Solving: A Statistician's Guide. Chapman & Hall.

• Cleveland W.S. 1985. The Elements of Graphing Data. Wadsworth, Belmont, California.

• Ehrenberg ASC. 1982. A Primer in Data Reduction. John Wiley.

• Erickson B.H. and Nosanchuk T.A. 1992. Understanding Data. 2nd Ed. Open University Press, Milton Keynes.

• Snell E.J. and Simpson HR. 1991. Applied Statistics: A Handbook of GENSTAT Analyses. Chapman and Hall.

• Sprent P. 1993. Applied Non-parametric Statistical Methods. 2nd Ed. Chapman & Hall.

• Tufte ER. 1983. The Visual Display of Quantitative Information. Graphics Press, Cheshire, Conn.

• Velleman PF and Hoaglin DC. 1981. Application, Basics and Computing of Exploratory Data Analysis. Duxbury Press.

• Weisberg S. 1985. Applied Linear Regression. John Wiley.

• Wetherill GB. 1982. Elementary Statistical Methods. Chapman & Hall.

• Wetherill GB.1986. Regression Analysis with Applications. Chapman & Hall.

• Cleveland WS. 1994. The Elements of Graphing Data, 2nd Ed., Chapman & Hall

• http://freestatistics.altervista.org/en/learning.php.
http://freestatistics.altervista.org/en/stat.php.
http://www.cas.lancs.ac.uk/glossary_v1.1/main.html.
http://www.stat.sc.edu/~grego/courses/stat706/.

• www.drs.icar.gov.in.

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PHDMCA511 Introductions to Communication Technologies, Computer Networking and Internet 1+1

Course code	Course Name	TEACHING & EVALUATION SCHEME							
		THEORY			PRACTICAL		L	P	CREDITS
		END SEM University Exam	Mid Term Exam	Teachers Assessment*	END SEM University Exam	Teacher's Assessment*			
PHDMCA511	Introduction to Communication Technologies, Computer Networking and Internet	60	00	40	30	20	1	1	2

Legends: L - Lecture; **P** – Practical;

*Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class etc.

Objective

Aim of the course:

This is a course on Introduction to Networking and Internet Applications that aims at exposing the students to understand Computer networking and web applications development.

Theory

Unit I

Networking fundamentals, types of networking, network topology; Introduction to File Transfer Protocol (FTP), Telnet.

Unit II

Simple Mail Transfer Protocol (SMTP), Internet Protocol v4 & v6. Network infrastructure and Security-switches, routers, firewall, intranet, internet, Virtual Private Network.

Unit III

World Wide Web (www), working with Internet; Web pages, web sites, web servers; Web Applications. Hyper Text Markup Language (HTML).

Unit IV

DHTML, web based application development. Static websites, dynamic websites.

Unit V

Client Side processing – scripting languages, Jquery. Server Side processing ASP.NET/JSP.

Practical

• Network and mail configuration;

• Using Network Services;

• Browsing of Internet;

• Creation of web pages;

• Creation of websites using HTML and scripting languages.

Suggested Readings

• Cox V, Wermers L and Reding E.E. 2006. HTML Illustrated Complete. 3rd Ed. Course Technology.

• Niederst J. 2001. Web Design in a Nutshell. O'Reilly Media.

• Tanenbaum A.S. 2003. Computer Networks. Prentice Hall of India.

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