

GURU KASHI UNIVERSITY
University College of Agriculture (Code:5)
M. Sc Agriculture – Entomology (Code: 508)

Anatomy and Physiology of Insects (508001)

Credits:2

LTP
2 0 0

Theory: Insect anatomy and physiology - importance and scope . Structure and physiology of insect integument. Comparative study of anatomy and physiology of digestive, circulatory, respiratory, excretory, reproductive, nervous, sensory, endocrine and exocrine systems. Embryonic and post-embryonic developments. Diapause. Insect nutrition, inter-cellular and intra-cellular micro organisms. Artificial diets and their formulations.

Morphology and Systematic of Insects (508002)

Credits:2

LTP
2 0 0

Theory: Evolution of insect body form. Primary and secondary segmentation, structure of typical secondary segment. Theories regarding segmentation of insect head. Comparative morphological characteristics of insects and their impact on insect classification. Insect sense organs and flight mechanism. History and importance of insect systematic. Taxonomic categories and keys. Rules of Zoological nomenclature, taxonomic principles and Zoo-geographical regions of world.

Insect classification: History and importance. Phylogeny of insects. Classification of Hexapoda with special emphasis on Class Insecta. Distinguishing morphological characteristics of economically important families of all the insect orders, their habits and habitats.

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Insect Ecology (508003)

Credits:2

LTP
2 0 0

Theory: Ecology-definition, ecosystem concept and organization levels. Food chains and food web. Characteristics of insect populations. Physical environment, its influence on abundance, distribution, rate of increase and diapauses in insects. Concept of intrinsic rate of increase. Biotic factors, intra- and inter-specific competition and relationships, for food and space on insects. Prey/predator models. Natural balance, population dynamics and regulation. Mechanisms of defense against predators/parasitoids. Estimating dispersal, migration and mortality factors. Life-tables and their application. Systems approach to ecology. Abundance and diversity of insects, its causes and estimates. Pest outbreaks and forecasting. Sampling techniques for population estimates of insects. Ecology as basis of pest management.

Toxicology of Insecticides (508004)

Credits:2

LTP
2 0 0

Theory: Definition of toxicology, importance, scope, basic principles of insecticide toxicology and its relationship with other disciplines. Structure and mode of action of organochlorines, organophosphates, carbamates, pyrethroids, neonicotinoids, oxadiazines, phenylpyrozoles, botanicals and new promising compounds etc. Criteria, methods, problems and solutions of bioassay. Evaluation of insecticide toxicity, joint action of insecticides, synergism, potentiation and antagonism. Factors affecting toxicity of insecticides, selectivity and phytotoxicity. Insecticide metabolism, pest resistance to insecticides, mechanisms and types of resistance, insecticide resistance management and pest resurgence. Insecticide residues, their significance and environmental implications. Insecticide Act, registration and quality control of insecticides, safe use of insecticides, diagnosis and treatment of insecticide poisoning.

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Bio-control of insect pests (508005)

Credits:2

LTP
2 0 0

Theory:

Bio-control - Principles, scope and techniques. Biology and host seeking behaviour of predatory and parasitic insect group. Role of insect pathogens and their mode of action. Biological control of weeds using insects. Techniques for mass production of biocontrol agents. Formulations, field application and evaluation of bioagents. Analysis of successful bio-control projects. Trends and future projections of biological control. Quarantine regulations for importing natural enemies of pests
Biotechnology and Semiochemicals in biological control

Host-Plant Resistance to Insects (508006)

Credits:2

LTP
2 0 0

Theory: History, importance, principles and classification of Host-Plant Resistance, Components and mechanisms of resistance. Insect and host plant relationships. Theories and basis of host-plant selection. Chemical ecology. Tritrophic relations. Volatiles and secondary plant substances. Basis of resistance. Factors affecting plant resistance including biotypes and measures to combat them. Screening techniques. Breeding for insect resistance in crop plants. Exploitation of wild plant species and gene transfer. Successful examples of resistant crop varieties in India and world. Role of biotechnology in plant resistance to insects.

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Insect-Pest Management (508007)

Credits:2

LTP
2 0 0

Theory: History, origin, definition and evolution of various related terminology of pest management. Concept, philosophy and ecological principles of IPM. Determination of crop losses and economic thresholds. Pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys. Integration of different pest management techniques. Political, social and legal implications of IPM. Pest and pesticide risk analysis, cost-benefit ratios. Case studies of successful IPM programmes. National and international institutions for integrated pest management.

Insect Vectors of Plant Pathogens (508008)

Credits:2

LTP
2 0 0

Theory: History of developments in the area of insects as vectors of plant pathogens. Important insect vectors and their characteristics. Mouth parts and feeding processes of important insect vectors. Transmission efficiency of different vectors. Transmission of plant viruses and fungal pathogens. Virus vector relationships. Transmission of plant viruses by insect and mites vectors. Transmission of mycoplasma and bacteria by leaf hoppers and plant hoppers. Epidemiology and management of insect transmitted diseases through vector management. Paratransgenesis.

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Credits:2	Industrial Entomology (508009)	LTP 2 0 0
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Theory:

Apiculture: History and development. Classification of bees and distribution of genus Apis. Morphological adaptations. Behaviour and activities of honey bees. Honey bee nutrition. Artificial queen bee rearing and bee breeding. Sex and caste determination. Honey bee ecology. Bee pheromones. Pests and diseases of honey bees. Bee poisoning. Diversification of apiculture. Planned crop pollination using bees.

Sericulture: History and development. Silkworm species and their characteristics. Bombiculture and Moriculture. Rearing and management of silkworms. Pests and diseases of silkworms. Silk and its uses.

Lac culture: History and development. Lac insect species, biology and their characteristics. Their management for lac production. Purification of lac to shellac. Uses of lac. Mass production of quality biocontrol agents and weed killers and their commercial use.

Credits:2	Storage Entomology (508010)	LTP 2 0 0
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Theory: Introduction, history and concepts of storage entomology. Post-harvest losses. Factors responsible for grain losses. Important pests namely insects, mites, rodents, birds and micro-organisms associated with stored grains and agricultural products. Association of stored grain insects with fungi and mites, their systematic position, identification, distribution, host range, biology, nature and extent of damage. Sources of infestation. Type of losses in stored grains and their effect on quality including biochemical changes. Ecology of insect pests of stored commodities. Stored grain deterioration process. Type of storage structures. Ideal storage conditions. Management of rodent and bird pests. Preventive and curative measures for the management of insect pests of stored grains. Characteristics of pesticides, their use and precautions in their handling with special emphasis on fumigants. Integrated approaches to stored grain pest management.

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Integrated Plant Disease Management (508011)

Credits:2

LTP
2 0 0

Theory: Introduction, definition, concept and tools of disease management. Components of integrated disease management, their limitations and implications. Development of IPDM and its adaptation in important cereal, oil seeds, fiber crops, legumes & coarse millets, vegetable and fruit crops.

Weed Management (504011)

Credits:2

LTP
2 0 0

Weed biology, ecology and crop-weed competition including allelopathy Scope and principles of weed management and control/weed classification, biology, ecology and allopath, crop weed . indices. History and development of herbicide. Classification and selectivity of herbicides based on chemical, physiological application and selectivity. Mode and mechanism of action of important herbicides. Herbicide structure- activity relationship and factors affecting the efficiency of herbicides. Herbicide formulations and mixtures. Weed control through bio-herbicides, myco-herbicides and allelochemicals. Degradation of herbicides in soil and plants. Herbicide resistance in weeds and crops herbicide rotations. Weed management in major crops and cropping systems. Management of parasitic weeds and special weed problems. Weed shifts in cropping systems. Aquatic and perennial weed control. Integrated weed management. Cost: benefit analysis of weed management.

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Agricultural Statistics (504021)

Credits:3

LTP
3 0 0

Frequency distribution, standard error and deviation, correlation and regression analyses, coefficient of variation; Hypothesis testing. Concept of p-value. Tests of significance-t, F and chi-square (X²); Data transformation and missing plot techniques; Design of experiments and their basic principles, completely randomized, randomized block, split plot, strip-plot, factorial and simple confounding designs; Efficiency of designs; Methods of statistical analysis for cropping systems including intercropping; Pooled analysis.

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Anatomy and Physiology of Insects Lab (508013)

Credits:1

LTP
0 0 2

Practical: Dissection and preparation of mounts of internal organs to study comparative anatomy of various organ systems of insects. Experiments to demonstrate physiological significance of cuticle, digestive, circulatory, respiratory, excretory, endocrine and exocrine systems. Preparation of artificial diets for insect rearing.

Morphology and Systematic of Insects Lab (508014)

Credits:1

LTP
0 0 2

Practical: Field visits to collect insects of different orders and their preservation. Identification of insects up to family level. Comparative study of morphological characteristics of insect types. Collection and preservation of insects and their identification with the help of taxonomic keys. Preparation of taxonomic keys.

Insect Ecology Lab (508015)

Credits:1

LTP
0 0 2

Practical: Measurement of microenvironment- maintenance of physical factors, calculation of rate of increase (rm), stable age distribution and fitting of logistic curve for population growth. Determination of distribution pattern, and size and number of samples. Estimation of population of different groups of insect pests. Measurement of insect diversity. Preparation of life-tables for determining mortality factors.

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Toxicology of Insecticides Lab (508016)

Credits:1

LTP
0 0 2

Practical: Insecticide formulation and mixtures, quality control of pesticide formulations. Working out doses and concentrations of pesticides for laboratory and field evaluation for their bioefficacy, bioassay techniques, probit analysis, evaluation of insecticide toxicity and joint action. Toxicity to beneficial insects.

Preparation of working standard solutions of pesticides, Sampling, extraction, clean-up and estimation of insecticide residues by various methods, calculations and interpretation of data, visit to toxicology laboratories.

Bio-control of insect pests Lab (508017)

Credits:1

LTP
0 0 2

Practical: Identification of common natural enemies of crop pests and weed killers. Techniques for rearing of natural enemies. Visits to bio- control laboratories to learn rearing and mass production of natural enemies of crop pests and weeds and their laboratory hosts. Field collection of parasitoids and predators. Hands- on training in culturing and identification of common insect pathogens. Quality control and registration standards.

Host-Plant Resistance to Insects Lab (508018)

Credits:1

LTP
0 0 2

Practical: Screening techniques for measuring resistance. Measurement of plant characters and working out their correlations with plant resistance. Testing of resistance in important crops. Demonstration of antibiosis, tolerance and antixenosis.

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Insect-Pest Management Lab (508019)

Credits:1

LTP
0 0 2

Practical: Characterization of agro-ecosystems. Sampling methods and factors affecting sampling. Population estimation methods. Crop loss assessments, potential losses, avoidable and unavoidable losses.

Insect Vectors of Plant Pathogens Lab (508020)

Credits:1

LTP
0 0 2

Practical : Identification of common vectors of plant pathogens- culturing and handling of vectors. Demonstration of virus transmission through vectors. Vector virus relationship studies.

Industrial Entomology (508021)

Credits:1

LTP
0 0 2

Practical: Morphological features of different castes of honey bees. Recording of colony performance data. Selection and breeding of honey bees. Latest techniques in mass queen bee rearing. Artificial diets and feeding. Production and extraction of hive products. Preparation of beekeeping projects. Recording pollination behaviour and determining pollination requirements.

Identification of different species of silkworms. Silkworm rearing equipment. Silkworm rearing and management. Diseases of silkworms. Lac insect and host management. Lac collection and processing. Mass production of predators and parasitoids.

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Storage Entomology Lab (508022)

Credits:1

LTP
0 0 2

Practical: Collection and identification of stored grains insect pests and their nature of damage. Detection of insect infestation in stored food grains and estimation of stored losses. Determination of micro flora of grains. Determination of grain moisture. Familiarization of storage structures. Laboratory culturing of stored grain pests. Demonstration of preventive and curative measures including fumigation techniques. Field visits to grain markets, central and FCI warehouses, and commercial silos.

Integrated Plant Disease Management Lab (508023)

Credits:1

LTP
0 0 2

Practical: Application of biological, cultural, chemical and bio-control agents, their compatibility and integration in IPDM. Demonstration of IPDM in certain crops as project work.

Weed Management Lab (504012)

Credits:1

LTP
0 0 2

Identification of important crop weeds. Preparation of a weed herbarium. Weed survey in crops and cropping systems. Crop-weed competition studies. Weed indices. Preparation of spray solutions of herbicides for high and low-volume sprayers. Use of various types of spray pumps and nozzles and calculation of swath width. Economics of weed control. Herbicide residue analysis in plant and soil. Bioassay of herbicide residue. Calculation of herbicidal requirement

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Agricultural Statistics Lab (504022)

Credits:1

LTP
0 0 2

Correlation analysis. Regression analysis (exponential, power function, quadratic, multi-variate, selection of variables, validation of models, ANOVA and testing of hypothesis). Tests of significance (Z-test, t-test, F-test and Chi-square test). Analysis of variance. Completely randomized design. Randomized block and latin square designs. Missing plot and analysis of covariance. 2^3 , 2^4 and 3^3 simple and confounded experiments. Split plot designs. Factorial in split plot designs.

Fundamental of Computer Application (504024)

2(NC)

Ms-word: creating a document, saving and editing, use of options from tool bars, format, insert and tools(spelling and grammar), alignment of text, creating a table, merging cells, column and row width. Ms-excel: entering expressions through the formula tool bar and use of inbuilt functions, sum, average, max, min. Creating graphs and saving with and without data in Ms-excel. Ms-access: creating database, structuring with different types of fields. Ms-power point: preparation of slides on power point. Internet Browsing: browsing a web page and creating of E-Mail ID. Agri. net (ARIS).

Library and Information Services (504025)

2(NC)

Introduction to Library and its services; five laws of library science; type of documents; classification and cataloguing; organization of documents; sources of information primary, secondary and tertiary; current awareness and SDI services; tracing information from reference sources; library survey; preparation of bibliography; use of Online Public Access Catalogue; use of CD-ROM databases and other computerized library services, CeRA, J-Gate; use of Internet including search engines and its resources; e-resources.

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Technical Writing and Communication Skills (504026)

2(NC)

Various forms of scientific writings: theses, technical papers, review, manuals etc., various parts of thesis and research communications: title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion; writing of abstracts, summaries, precis, citations etc. commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; paginations, numbering of tables and illustrations; writing of numbers and dates in scientific write-ups; editing and proof reading; writing a review article. access methods.

Masters Research (508024)

48 (NC)