Board of Studies Meeting (Department of Entomology)

Organised virtually (on google meet) on 15th May, 2021 at 10 am onwards

Participants:

1. Prof. Nand Lal, Deppt. of life science, CSJM University, Kanpur
2. Prof. C. P. Srivastav, Professor of Entomology, B.H.U. Varanasi
3. Prof. Y. P. Malik, Professor of Entomology, CSA Univ. of Agri. and Tech. Kanpur
4. Dr. Dev Narayan Singh, Associate Professor, Deptt. of Entomology, Janta College, Bakewar (Etawah)
5. Dr. B. B. Singh, Assistant Professor, Deptt. of Entomology, Janta Mahavidyalay, Ajitmal (Auraiya)
6. Dr. Mahesh Prasad Yadav, Convenor and Associate professor, Deptt. of Horticulture, Janta College, Bakewar (Etawah)

Minutes Of Meeting:

BOS meeting of deptt. of Entomology was held to adapt syllabus as suggested under New Education Policy (NEP 2020) with the presence of various renowed experts of the subjects. The outcomes of meetings are as under.

1. Syllabus suggested under NEP 2020 is accepted and recommended for implementation.
2. Suggestions given by Prof. C. P. Srivastav and Prof. Y. P. Malik regarding minor ammendments and corrections have been incorporated.
3. Website names as well as books names have also been suggested in the syllabus adapted by board.
4. Board also suggested that as per the norms of ICAR the name of Department should be "Entomology".
5. Board also suggested that master degree in subject will be "M. Sc. (Ag.) Entomology"

Enclosures: Corrected final syllabus of Entomology for B. Sc. (Ag.) programme.

Prepared by: **Dr. Dev Narayan Singh**

Convenor

Dr. M. P. Yadav

Department of Entomology

Sr. No.	Course code	semester	Name of papers	Credit hrs.
1	AG-203	II	Fundamentals of Entomology-I (Insect Morphology and Taxonomy)	3 (2+1)
2	AG-312	III	Fundamentals of Entomology-II (Insect Ecology and concept of IPM)	2 (1+1)
3	AG-503	V	Pests of Field crops & Stored Grain and their Management	3 (2+1)
4	AG-608	VI	Beneficial insects and Pest of Horticultural Crops and their Management	3 (2+1)

1. FUNDAMENTALS OF ENTOMOLOGY-I (INSECT MORPHOLOGY & TAXONOMY) 3(2+1) AG-203

Theory

Classification of phylum Arthropoda up to classes. Relationship of class insecta with other classes of arthropoda. Morphology: Structure and functions of insect cuticle and moulting. Body segmentation. Structure of head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, wing venation, modifications and wing coupling apparatus. Structure of male and female genital organs. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive systems in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes and chemoreceptors. Systematics: Taxonomy- -importance, history and development and binomialnomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae. Dictyoptera: Mantidae, Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae. Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae,

Lophophidac, Alcurodidac, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidac, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae,Muscidae, Tephritidae.

Practical

Methods of collection and preservation of insects including immature stages: External features of Grasshopper/Blister beetle: Types of insect antennae. mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of orders Orthoptera. Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

Suggested Literature/Readings:

E-resources

1. Development of e-Course for B.Sc (Agriculture) (eagri.org)
2. eCourses (icar.gov.in)
3. https://agritech.tnau.ac.in
4. Course: Fundamentals of Entomology (2+1) (iasri.res.in)

Books

1. Chapman, R. F 2013 Insects: Structure and Function. Ed by Simpson, S. J. and Douglas, A. C. Cambridge Univ. Press, UK.
2. Richards, O.W. and Davies, R.G 1977. Imm's General Text Book of Entomology (Vol. I and II). Chapman and Hall, London.
3. Wigglesworth, V.B 2013. Insect Physiology. Springer (Originally published by Chapman and Hall, London, 1974).
4. Pant, N.C. and Ghai, S. 198. Insect Physiology and Anatomy. ICAR, New Delhi.
5. Kapoor, V. C 2008. Theory and Practice of Animal Taxonomy. Oxford and IBH Publishing, New Delhi.
6. Charles A Triplehom and Norman F. 2005. Borror and De Long's Introduction to the Study of Insects. Johnson Thomson Brooks/Cole Publishing. U.S.A.
7. Snodgrass, R.E. 2001. Principles of Insect Morphology. CBS Publishers & Distributors, Delhi. 8. Timbhare, D.B. 2015. Modern Entomology, Himalaya Publishing House

2. FUNDAMENTALS OF ENTOMOLOGY-II (INSECT ECOLOGY & CONCEPTS OF IPM) 2(1+1) AG-312

Theory

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors- temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors - food competition, natural and environmental resistance.

IPM:

Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control- importance, hazards and limitations. Recent methods of pest control, repellents, antifeedants, hormones. attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aidand antidotes. Survey, surveillance and forecasting of insect pests. Safety issues of pesticides uses.

Practical

Sampling techniques for estimation of insect population and damage. Insecticides and their formulations. Pesticide appliances and their maintenance.

Suggested Literature/Readings:
E-resources

1. Development of e-Course for B.Sc (Agriculture) (eagri.org)
2. eCourses (icar.gov.in)
3. https://agritech.tnau.ac.in
4. Course: Fundamentals of Entomology (2+1) (iasri.res.in)

Books:

1. Vasantharaj David, B. and Rama Murthy V.V. 2016. Elements of Economic Entomology, Popular Book Depot, Coimbatore.
2. Vasantharaj David, B and Aanathakrishnan, T.N. 2006. General and Applied Entomology. Tata McGraw-Hill Publishing House, New Delhi.
3. Metcalf, R.L. and Luckman, W.H. 1982. Introduction to Insect Pest Management. Wiley Inter Science Publishing, New York.
4. Atwal, A. S. and Bains, S.S. 1989. Applied Animal Ecology. Kalyani Publishers, New Delhi
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
7. Dhaliwal GS & Arora R. 2003. Integrated Pest Management – Concepts and Approaches. Kalyani Publ., New Delhi.
8. Dhaliwal GS, Singh R & Chhillar BS. 2006. Essentials of Agricultural Entomology. Kalyani Publ., New Delhi.
9. Gautam, R. D. 2008. Biological Pest Suppression. Westville publishing House New Delhi
10. Larry P Pedigoand Marlin E Rice. 2009. Entomology and Pest Management. Prentice Hall of India Private Ltd., New Delhi

3. PESTS OF FIELD CROPS, STORED GRAINS AND THEIRMANAGEMENT [3] 3(2+1) AG-503

MYadav

Theory

General account on nature and type of damage by insect pests. Scientific name, order, family, host range, distribution, biology and bionomics. nature of damage, and management of major arthropod pests of various field crops. Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

Paddy: *Leptocorisa varicornis, Hieroglyphus Spp., Nilaparvata lugens, Nephotetix, spp. Mythimna separata.*

Jowar Maize: *Chilo partellus. Atherigona variasoccata, Scirpophaga excerptalis. Chilo infuscatellus*

Sugarcane: *Top borer, Pyrilla, Early Shoot borer and white fly*

Cotton: *Pectinaphora gossypiella. Earias Spp , Sylepta derogata, Dysdercus Spp Bemisiatabaci. Amrasca bigutulla*

Oilseeds: *Lipaphis erysimi, Athalia proxima, Bagrada cruciferarun, Dasyneura*

Pulses: *Helicoverpa armigera, Agrotis Spp.. Etiella zinckenella, Malanagromyza obtusa*

Pests of Stored Grains: *Sitophilus oryzae, Trogoderma granarium, Sitotroga cerealella ,Callosobruchus chinensis.*

Polyphagous pests: *Odontotermes obesus, Holotrichia consanguinea, Spilosoma obliqua, Spodoptera litura, Amsacta Spp.* The fall armyworm (*Spodoptera frugiperda*)

Practical

Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking field crops and their produce. Identification of insect pests and mites associated with stored grain. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticidesapplication technique. Fumigation of grain store and godown. Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory. Department of Food Delhi. Visit to nearest FCI godowns.

Suggested Literature/Readings:

E-resources

1. Development of e-Course for B.Sc (Agriculture) (eagri.org)
2. eCourses (icar.gov.in)

3. https://agritech.tnau.ac.in
4. NPTEL :: Agriculture - NOC:Integrated Pest Management (IPM)
5. Applied Entomology - Course (swayam2.ac.in)

Books:

1. Vasantharaj David, B. and Rama Murthy V.V. 2016. Elements of Economic Entomology, Popular Book Depot, Coimbatore.80
2. Vasantharaj David, B and Aanathakrishnan, T.N. 2006. General and Applied Entomology. Tata McGraw-Hill Publishing House, New Delhi.
3. Nair MRGK. 1986. Insects and Mites of crops in India. Indian Council of Agricultural Research New Delhi.
4. Ramakrishna Ayyar, T.V. 1963. Handbook of Economic Entomology for South India. Government Press, Madras.
5. Dennis S Hill 1987 Agricultural Insect Pests of tropics and their control, Cambridge Universtiy Press , New York
6. Upadhyaya K.P. and Kusum Dwivedi. 1996. A Text Book of Plant Nematology. Aman Publishing House, Meerut.
7. Khare, S.P. 1993. Stored Grain Pests and their Management. Kalyani Publishers, Ludhiana.
8. Atwal, A.S. 1976. Agricultural Pests of India and South East Asia. Kalyani Publishers, Ludhiana

4. BENEFICIAL INSECTS and PESTS OF HORTICULTURAL CROPS AND THEIR MANAGEMENT 3 (2+1) AG-608

Theory

Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties, methods of harvesting and preservation of leaves. Rearing of mulberry silkworm, rearing appliances, mounting and harvesting of cocoons. Pests and diseases of silkworm, management, and methods of disinfection. Importance of beneficial insects. Bee keeping, pollinators and their cycle, bee biology, commercial methods of rearing, equipment used and seasonal management. Bee pasturage. bee foraging and communication. Insect pests and diseases of honey bee. Species of lac insect, morphology, biology. host plant and lac production

- Processing of lac - seed lac, button lac. shellac and lac- products. Identification of major parasitoids and predators commonly used in biological control.

Practical

Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking horticultural crops - vegetable crops, fruit crops, plantation gardens, narcotics, spices & condiments. Visit to orchards and gardens. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Types of silkworm, voltinism and biology and rearing of silkworm and equipment. Honey bee species and castes of

bees. Beekeeping appliances and seasonal management. Bee enemies and diseases. Bee pasturage, bee foraging and communication. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers. Visitto research and training institutions devoted to sericulture, bee keeping., lac culture and natural enemies.

Suggested Literature/Readings:

E-resources

1. Development of e-Course for B.Sc (Agriculture) (eagri.org)
2. eCourses (icar.gov.in)
3. https://agritech.tnau.ac.in
4. Applied Entomology - Course (swayam2.ac.in)

Books:

1. Vasantharaj David, B. and V.V. Rama Murthy (2016). Elements of Economic Entomology, Popular Book Depot, Coimbatore.85
2. Butani, D.K. and Jotwani, M.G. 1984. Insects in Vegetables. Periodical Export Book Agency, New Delhi.
3. Butani, D. K. 1984. Insects and Fruits. Periodical Export Book Agency, New Delhi.
4. Ganga , G and Sulochana Chetty, 1997. Introduction to Sericulture, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi
5. Hisao Aragu 1994. Principles of Sericulture, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
6. Singh, S.1975. Bee Keeping in India - Indian Council of Agriculture research, New Delhi.
7. Mishra, R.C. 1995. Honey Bees and Their Management in India – Indian Council of Agricultural Research, New Delhi.
8. Glover, P.M.1937. Lac cultivation in India. The Indian Lac research Institute, Ranchi
9. Abrol, D.P. 2010. Beekeeping: A Comprehensive Guide on Bees and Beekeeping. Scientific publishers, Jodhpur
10. Nair, MRGk. 1990. Monograph on Crop Pests of Kerala and their Control. Trissur Directorate of extension, Kerala agricultural University.