



AGROCHEMICALS AND PEST MANEAGEMENT

M. Sc-Part-II

(SEMESTER-III& IV)

SYLLABUS
(Credit System)

(To be Implemented from June, 2009)



AGROCHEMICALS AND PEST MANEGEMENT

M. Sc-Part-II (Semester-III and IV)

SYLLABUS (June 2009)

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SEMESTER-III

PAPER -IX: PESTICIDE RESIDUES AND TOXICOLOGY

PAPER-X: ADVANCES IN PEST CONTROL-I

PAPER-XI: ANALYSIS OF AGROCHEMICALS

PAPER-XII: PEST AND DISEASES OF CROP PLANTS-I

CHEMISTRY PRACTICAL-V: BASED ON PAPERS IX & XI

LIFE SCIENCE PRACTICAL-VII: BASED ON PAPERS X& XII.

SEMESTER-IV

PAPER-XIII: Agro-based Marketing Management

PAPER-XIV: ADVANCES IN PEST CONTROL-II

PAPER-XV: AGRO-BASED MARKETING MANAGEMENT

PAPER-XVI: PESTS & DISEASES OF CROP PLANT-II

PRACTICAL- VII: BASED ON THE PAPERS XIII& XV. (Chemistry)

PRACTICAL- VIII: LIFE SCIENCE (BOTANY&ZOOLOGY)

Paper-XIII:
PESTICIDE RESIDUES AND TOXICOLOGY

Unit-I: Residues of Agrochemicals :

a) Pesticides Residues in the Atmosphere: (5)

Pesticides into the atmosphere and their fate, transport of vapors, precipitation, effect of residues on life, Photochemistry of pesticides.

b) Pesticides residues in water system: (5)

Nature and origin of pollution of aquatic systems, point and non point pollution. Dynamics of pesticides in aquatic environment.

c) **Pesticides residues in the soil:** (5)

Absorption, retention, transport and degradation of pesticides in the soil, effect on microorganisms and consequent effect on the soil condition, fertility, interaction in the soil, geohydrological aspects.

Unit-II: Extra microsomal metabolism of insecticides and Selectivity concepts: (15)

Enzymatic conjugation, OP and OC metabolism, Electrophysiology of nervous system and insecticide action. Acetylcholine esterase inhibition, parameter affecting action of pesticides, Development of pesticide resistance. Ecological and physiological selectivity, Penetration excretion, Metabolic alterations of toxicants, Poly factorial nature of selectivity, Prospects of selective pesticides, Resistance concept and its significance. Treatment of insecticide poisoning OP, OC, carbamates. Mode of action of herbicides.

Unit-III: Pesticide residue Penetration and Distribution: Effect of pesticide residues on the quality of human life. (15)

Model ecosystem studies of bioconcentration, biomagnifications and biodegradation effect of pesticides on life in general and consequent effect on human life. The Cases of & affected societies and starving populations facing problems of health and nutrition, traditional wisdom and food security.

Unit-IV. Pesticide analysis: (15)

Special techniques, Sample preparation methods and pesticide residue analysis. and biopesticides, poisoning effects, symptoms and treatment. Further prospects of research and technology, Development of safe pesticides. Effluents of Agrochemicals and their disposal.

Reference Books:

1. Chemical analysis of the environment by Ahuja.
2. Environmental chemistry by A. K. De.
3. Chemistry of our environment by Home (JW).
4. Analysis of pesticides residues by H. A. Moye (JW)
5. Advance in pest control research by R. L. Methcalf (JW)
6. Chemistry of pesticides by K. H. Buchel (JW).
7. Progress in pesticides biochemistry and Toxicology V. I, II, III by D. H. Hutson and T. R. Robert.
8. Evaluation of pesticides in ground water by W. Y. Garnett, R. C. Honeycatt and others.
9. Chemistry of pesticides by Edward
10. Insecticide biochemistry and physiology by C.F. Wilkinson.
11. Progress in pesticide Biochemistry and toxicology WI, I, II, III by D.H. Hutson and T.R. Roberts.
12. Comprehensive insect physiology, Biochemistry and pharmacology WI, 12, by G.A. Kerkut and L.I. Gilbert.
13. Modern toxicology WI, I, II, III by P.K. Gyota and D.K. Salunkhe.
14. Toxicology by C.D. Kiassen, M. D. Amdur and J. Doull.

PAPER-X
ADVANCES IN PEST CONTROL-I

Unit-I: Introduction to Applied Entomology : (15)
Causes for insect assuming pest status, type of damage to plant by insects and their estimation. Methods and principles of pest control, natural and applied .Prophylactic & Curative methods, cultural, mechanical. Physical, legal and biological.

Unit-II: a) Bioefficacy of some pesticides against major pests: (7)
Evaluation of toxicity of insecticides, Bioassay methods, Insecticide resistance and Resistance management.

b) Host Plant Resistance: (8)
Introduction, Classification of resistance mechanism of resistance, Evaluation of Antixenosis and anti-biosis, Morphological & Biochemical basis of resistance, Insect biotypes, Breeding for insect resistance, Factors affecting plant Resistance

Unit-III: Recent advance in pest control: Green Chemistry in pesticides: (15)
Recent and insect attractants, chemosterilents and repellents, mode of action and Applications Neem in plant protection: Introduction, Chemical constituents, Bioefficacy of neem preparation, Management of pest in Agricultural crops, Management of the forest pest, Management of insects and diseases in stored agricultural commodities, side effects of applications,

Unit-IV
a) Plant protection appliances: (5)
Duster, principles of dusting, spraying, Part of typical sprayer, types of sprayer. Types of nozzles and other equipments
b) Controlled release pesticides fertilizers and their formulations (10)

Reference Books

1. Text of applied Entomology Vol I & II-K.P.Srivastava.
2. Introduction to insect Pest Management.
3. Textbook of insects toxicology.
4. Introduction to biological control.-R.Bosch, D.S.Messenger & A.D.Gutierrez.
5. Principles of insect Pest Management. –G.S.Dhaliwal and R.Arora.
6. Entomology and Pest Management –Larry P.Pedigo.
7. Element of economic entomology –B.V.David and T.Kumarswamy.
8. Insect Pest Management –David Bent.
9. Critical issues in insect pest Management –G.S.Dhaliwal and E.A.Heinrich.
10. Emerging trends in biology control of phytophagous Ed.T.N.Anatkrishnan.
11. Toxicology of insecticide-Fumio matsumura.
12. Biological pest suppression –H.C.Coppelend and J.W.Martin.
13. Neem in plant protection: R.T.Gahukar, Agri-Horticultural Pub.Nagpur,2003.

PAPER-XI
ANALYSIS OF AGROCHEMICALS

Unit-I:

(15)

- a) Separation Technique:** Principles, instrumentation and application of gas Chromatography and HPLC.
- b) Gas analysis :** Analysis Of SO_2 , NO_x , CO , CO_2 , NH_3 , and H_2S in the effluent gases.

Unit-II

(15)

- a) Radioactivity-** Measurement, Application of radio isotope in agriculture, Health hazard of activity ratio, Neutron activation analysis and its application.
- b) Polarography,** Voltage current, curves, analysis of polarogram, application of ultraviolet spectrophotometer in the analysis of agrochemical and pest residue and metabolites.
- c) Fluorescence spectroscopy:** Basic principles, methodology, applications.

Unit-III

(15)

- a) Ultraviolet spectroscopy:** Principles instrumentation and applications
- b) Infrared spectrometry:** Principles instrumentation application.

Unit-IV

(15)

- a) Nuclear magnetic resonance spectrometry:** Nuclear spin and absorption of radiofrequency, chemical shift, application in pesticide residue analysis NMR spectroscopy.
- b) Mass spectrometry :** Schematic of mass spectrometer, ionization and Fragmentation of molecules. Interpretation and application in the pesticide residue and metabolites analysis GC-MS techniques.

Reference Books

1. Spectroscopic methods in Organic Chemistry –D.H.Williams and I.Flemming.
2. Instrumental methods of analysis –Willard and Merittee, Dean.
3. Application of spectroscopic techniques inorganic Chemistry-P.S.Kalsi.
4. Concept in analytical Chemistry –S.M.Khopkar.
5. Analysis of pesticide residue –H.A.Moye(JW).
6. Advance in pest control research –R.L.Metcalf.
7. Application of absorption in Spectroscopy –J.R.Dyer.
8. Soil and plant analysis –C.S.Piper(Hans pub.)
9. Soil and Plant analysis-C.S.Piper (Hans pub.)

PAPER-XII
PEST AND DISEASES OF CROP PLANTS-I
(Cereals, oil seeds, Pulses, Cash Crops & Folder Crops)

Unit-I: (15)
a) Pest Management: Tactics and strategies of pest management (IPM) Concept and tools of pest management, ECO system concept, Ecological Niche concept, colonization of island, crop island in ecosystem, Quantitative Basis of pest management sampling and measuring system Analysis and Modeling in pest management, monitoring forecasting and field loss Assessment. *Designmaking system, constrains and Strategic in implementation of z pm, validation of IPM. *Host plant resistance.

b) Pests of Crops:
(Classification, Biology, nature of damage and control measures).

A) Pests of cereals :

- a) Rice:** **I) Major-** Brown plant hopper, Yellow stem borer, Swarming Caterpillar.
 II) Minor – Rice ear head bug, armyworm, pink borer, Rice hispa.
- b) Sorghum :** **I) Major** – Midge fly, Aphids , Shoofly.
 II) Minor- Leaf roller.
- c) Maize:** **I) Major-** Bug (Deliphacids), Ear head bug, stem borer, pink borer.
 II) Minor- Pyrilla, Aphids.
- d) Pearlmillet:** **I) Major-** Blister beetle.
 II) Minor Surface grasshopper, armywarm.
- e) Wheat:** **I) Major-** Jassids, Termites, stem borers.
 II) Minor- Aphids, nematodes.

Unit-II (15)

B) Pests of pulses & vegetables:

- a) Pulses: Chickpea, Pigeon pea, Cowpea, Peas, Green gram, Blackguard, Kidney bean Cluster bean etc.**
 I) Major- Gram pod borer, Tur pod bug, Red gram, Pea aphids and *spodoptera*
 II) Minor- Bean fly, Aphids, thrips, Mites.

b) Pest of Sugarcane:

- I) Major:** Early shoot borer, White grubs, White fly, R.
II) Minor: Stalk borer, Armyworm, Mites, pyrilla, sugarcane woolly aphid, termites, plassy borer.

c) Pests of oil-seed Crops:

- i) Groundnut: I) Major: Groundnut leaf miner aphid.
II) Minor: Stem borer, & Bahrain caterpillar
- ii) Sunflower: I) Major: Head borer, Bihar hairy Caterpillar.
- iii) Safflower: I) Major: Aphid & Leaf eating Caterpillar.
II) Minor: Safflower bud fly.
- iv). Mustard: I) Major: Mustard aphid.
II) Minor: Diamond back moth.
- v) Soybean: I) Major: Pod borer, Jassids, Grey weevil.
- vi) Caster: I) Major: caster capsule borer, caster semilooper.
II) Minor: Caster whit fly.
- vii) Sesame: I) Major: Til hawk moth, pod sucking bug,
- viii) Linseed: I) Major: Gally-fly
II) Minor: Whitefly & jassids.
- xiv) Cotton crop: I) Major: Pink bollworm & mite, Red cotton bug.
II) Minor: Cotton leaf roller, Cotton stem weevil, mealy bug.

d) Pests of Forage crops:

Lucerne or Alfa-alfa:

- I) Major: Aphids, Cutworm, Armyworm.
- II) Minor: White spotted flea beetle.

Bersim

- I) Major: gram pod borer, hair caterpillar, Spotted alfalfa aphid.
- II) Minor: Red pumpkin beetle, Grass hopper.

Unit-III

(15)

Fungal Diseases of the crop plants:

(Study of symptoms, Life cycles, Nature of Damage and management)

a) Cereals:

Rice: Blast of rice, Helminthosporium diseases of rice, false smut of rice, Seeding blight, Udbatta disease.

Sorghum: Rust, Smuts, Downey mildew diseases & rots
Foliage, grain mold.

Wheat: Rusts & Smut diseases, & Root rots.

Maize: Rusts, Smuts, Seeding diseases, Blights, Ear rots.

Bajara: Rusts, Ergot, Downey mildews & Blast diseases.

b) Pulses and vegetables: (Chickpea, Pigeon pea, CowPea, green gram, Black gram, beans etc.): Rusts, Powdery mildew, Wilts, Blights, Anthracnose, Rots etc.

Unit-IV

(15)

a) Oil seed crops: (Major and Minor)

i)Groundnut: Rust, Early and late leaf spot diseases (Tikka) seed rot (aspergillus spp.) & seedling blight (penicillium spp.) Root rots (sclerotium & Rhizoctonia, Fusarium spp.)

ii)Soybean : Rust, Leaf spot, Brown stem rot, anthracnose, pod & stem blight, Fusarial wilt, rots, Leaf spot diseases.

iii)Sunflower: Rust, Powdery mildew, Downey mildew, Blight, seeding diseases.

iv)Safflower: Rust, Root rots.

v)Mustard: White rust, powdery mildews, seedling blight, wilt & Rots.

vi)Castor: Rust, Leaf spot, and seedling diseases.

vii)Sesame: Leaf spot, powdery mildews, wilt.

b) Cash-crops:

i)Cotton : Rust , Wilt, anthracnose & blights, Leaf spot , Seedling diseases.

ii)Sugarcane: rot, rust, smuts, Downey mildew, rots-basal, root, and top, Red rot,GSD,Pokhan boing

iii)Tobacco: early blight, black rot & shank rots, wilts.

c) Forage crops :

i)Monocots : Maize, sorghum spp., Sudan grass, pennisetum spp., Fodder grasse (Wild & cultivated)-their diseases.

ii)Legumes : Clover, Lucerne, Bersim, alfalfa, sesbanic spp, Cow Pea, Leucaen spp.- their common diseases.

Reference Book :

- 1.Handbook of pest management in Agriculture by pimental.
- 2.Plant pathology by G.N.Agrios.
- 3.Principles of insect pest management by Dhaliewal and Arora.
- 4.Agricultural pest of india & south East Asia by A.Satwal.
- 5.Pathological problems of economics crop plants & their management by paul Khurana, S.M., 1998.
- 6.Fungire & plant diseases ,by Mundkur B.B.1995.
- 7.Tropical plant diseases by turston H.D.
- 8.Integrated Diseases management and plant health by Gupta V.K.& sharma R.C.
- 9.Diseases of millets by Ramkrishnan T.S. I.C.A.R.publ. New Delhi.
- 10.Fungal diseases of rice in india by padmanabhan S.Y. I.C.A.R.publ., Delhi.

**SEMESTER-III
CHEMISTRY PRACTICAL-V**

BASED ON PAPERS SIX & XI

Pesticide analysis:

1. Estimation of Endosulphan iodometrically.
2. Estimation of Dicofol content.
3. Determination of phorate content.
4. Estimation of Malathion residue in given sample
4. Saponification and acid values of oil.
5. Estimation of phosphate from super phosphate.
6. Estimation of sulfate from super phosphate
7. Estimation of Simazine by colorimetric method
8. Estimation of cabendazim in given formulation
9. Estimation of cabaryl in a given formulation
10. Determination of caffeine from tea leaves.
11. Isolation of lactose from milk.
12. Analysis of soil samples: Estimation of Ca, Mg, carbonate (CO_3^{--}) and bicarbonate (HCO_3^-) by Titrimetric analysis.
13. Preparation of formulations
14. TLC and Column chromatographic separation of the pesticides or plant products.

Pesticide Toxicity

- 15) Detection of pesticides residue in food stuffs.
- 16) Detection of pesticides plants.

REFERANCE BOOKS

1. A Textbook of Inorganic quantitative analysis by A. I. Vogel.
2. Methods of pesticides analysis by Shree Ramulu.
3. A Text book practical Organic Chemistry including qualitative and quantitative analysis by A. I. Vogel.

LIFE SCIENCE PRACTICAL-VII: BASED ON PAPERS X & XII.

1. Rearing of pest species. (3 to 4 species).
2. Study of life cycles of important pests of crop plants as per syllabus at least two of each category and laboratory and field diary..
3. Study of the detection of damage caused by pests.
4. Identification of different casts of termites.
5. Determination of moisture content of Plant material/soil by using IR moisture balance.
6. Determination of parathion residues in foodgrains / plant materials and vegetables.
7. Study of the plant diseases of the following crops, at least 1 or 2 of each crop- Rice, Sorghum, Bajara, Beans, Oilseeds & Cash-crops. (at least one/two diseases of each crop locally available.)
8. Plant disease their intensity & to calculate VI (Virulence index) at least of two diseases.
9. Separation and identification of sugars & Organic acid from healthy and infected plant.
10. Collection of Pest stages.
11. Collection and submission of discerned plant parts.
12. Estimation of Curcumin from Turmeric
13. Any suitable experiment may be added whenever necessary.

Semester-IV

Paper XIII: AGRO-BASED MARKETING MANAGEMENT

Unit-I (15)

a) Marketing definition, concepts, scope, Importance,

Types, Approaches, Models, Principles. Agricultural growth, development, Policy, Role of NABARD, APEDA, RBI.

b) Market process & planning Concept

Creating & delivering customers value Marketing mix, marketing environment & Approaches, Future marketing.

Unit-II (15)

A) Indian marketing environment ,

Challenges, Economy Scope, Importance, Scenario

b) Marketing strategies

Marketing planning & strategies, Analysing industry & competition., competitive advantage & Market risk, Problems & Agri.- Marketing .

Unit-III (15)

a) Analysing consumer & Seleting market:

Bayers behaviour, Indian consumer, Target marketing, STP Segmentation, target, positioning .

b) Distribution channels

Types, Definition, Channels.

c) Direct marketing , Branding

,Globalization & consumer behaviour, Supply chain management ,Shoot Analysis, 4 Ps – Product, Price, Place, Promotion , Product life cycle & pricing, new product development, Advertising / Promotion,

d) Sales & Distribution

Demand measurement, Market research & methodology, Market evaluation & controls ,sales characters definition, types.

Unit-IV

(15)

- a) Marketing ethics & Audit ,
Storage, After & before sales service
- b) Rural marketing in India cooperatives in Agribusiness Marketing.
- c) Agriculture export & import process, Policies, Taxation,
Laws, Packing Norms, etc. use of It or export market.
- d) International marketing, WTO, GATT, etc. Laws.
- e) Details studies on marketing process in the Netherlands, Israel, Japan
USA, Australia. Present status of Indian export in comparison to
develop countries.
- f) Agricultural project analysis Agrifood, service , Industry.
- g) Case studies, Agri. Input industry, Food, Wholesaling, Retailing, mall.
- h) Group discussion, & group presentation.

Reference books.

- 1) Marketing : Philip kofler
- 2) Marketing : V.S Management by Ramaswami
- 3) Marketing of – Richard L.
- 4) Agricultural Kohls & Products Joseph N. D.

PAPER-XIV
ADVANCES IN PEST CONTROL-II

Unit-I:

(15)

a).Biocontrol in Agroecosystem through management & Entamophagous insects:

Introduction Role and impact of predators, parasitoids Biological characteristics, Role and impact strategies of biological control, conservation and habitat management.

b)Microbial control of insect:

Introduction, History principle groups of pathogen, Bacillus thuringensis, fungi, viruses, protozoa, their mode of action and methods of applications.

Unit-II

(15)

Biorational and other innovative approaches: Introduction, chemicals based on insect cuticle chitine, Protein chemicals: based on Endocrine system- Brain, Juvenile and moulting hormones, chemicals based on communication system: Allelochemicals and pheromones.

Unit-III

a) Miscellaneous Approaches:

Light activated pesticides, Pro-pesticides, genetic control, and chemosterilants

b)Current status of Biorationd use- insect growth regulators & semiochemicals.

Unit-IV

Biotechnology approaches in pest management: Introduction, recent advance in use of fungi, viruses and Bt. Methodology in Biotechnology, somaclonal variability and genetic engineering, transgenic plants microbial origin & protenase inhibitor.

Reference Books

- 1.Biological insect control chapter 10-14, by M.S. Quraishi.
- 2.Biological insect pest suppression by H.C.Cooper (spingler verlag)
- 3.Agriculture use of anti-biotics by W.A. Moats.
- 4.Pesticide chemistry by j.Miyamoto and P.C.Kearney (Pergamon)
- 5.Hand book of pest management in agriculture Wi.II by D. pimentel.
- 6.Biological pest control by N.W. Hussey and N. Scopes (Glandford press)
- 7.Safer pesticides by E. Hodgson and R.J.Kuber (Dekker)
- 8.Insect sex pheromones by M.Jacobson (AP).
- 9.Control mechanisms in plant development by A.W. Gloston and P.J.Davies.

Insect pathogenic fungi as pest control agent in “Biological plant & Health Protection” by Zimmermann,G.

PAPER-XV
MANUFACTURES OF AGROCHEMICALS

Unit-I:

(15)

Types of unit operations & the Study of the following:

Extraction: Principles, equipment of solid-liquid and liquid-liquid extraction.

Evaporation: Purpose, operation of multiple effect evaporators.

Distillation: Fractional distillation, plate and packed columns steam distillation of Azeotropes.

Absorption: Gas absorption in towers.

Filtration: Types of filters, working of centrifuge.

Crystallization: Purpose, Batch and continuous crystallizes.

Drying: Types of dryers, working of compartment tray and spray dryers.

Reactors: Diagrams and working of a Batch reactor.

Unit-II:

(15)

- a) **Quality control and R&D:** Quality control concept, specification and analytical procedures control of quality of raw material, intermediates and finished goods, batch inspection, R&D laboratory specifications, ASTM, BIS, ISI Specification and standards
- b) **Small Scale Industry:** Pesticides industries in India, Norms, Government's policy, benefits regulations, administration, marketing and management, planning of small scale units economics, licenses marketing of Agrochemicals, marketing research know-how, man-power, HRD.

Unit-III:

(15)

Designing of synthesis of pesticides: Retrosynthetic analysis, synthon approaches, synthetic equivalence, Types of disconnection, chemo selectivity, Retrosynthesis of agrochemicals, pheromones and synthetic plant products.

Unit-IV:

(15)

- a) **Manufactures of Pesticides and other Agrochemicals:**

(Unit processes are to be discussed as they occur in the sequences) typical representative compounds like Captan, dimethoate, Phosphamidon, Maneb, Ag grade sulfur be chosen for detailed study

- b) **Occupational Health Hazards and their control in Agrochemical**

Industries: Handling of chemicals and Pesticides Hazards Occupational Asthma and pulmonary diseases, Dermatitis & Cancer. First Aid Emergency medical

Response, Medical organization for major accident hazard control, importance and various kinds of first Aids. Health education for workers. Occupational Health Management .Industrial safety.

Reference Book

1. Unit Operations: W.L.Badger.
2. Unit processes in organic synthesis: P.H.Groggins.
3. Encyclopedia of chemical technology: Kirk and Othmar.
4. A text book of chemical technology: S.D.Shukla &G.N.Pendey.
5. Industrial chemistry by James Kent & Reigel.
6. Survey of industrial chemistry 2 Ed. by P.J.Chenier
7. Industrial chemicals: F.A.Lowheim and M.A.Moran.
8. Encyclopedia of pesticides Manufacture.
9. Industrial organic chemistry

- i) Betlevine: I) Major: Whitefly ,Nematodes.
II) Minor: Aphids.

Unit-II

(15)

A) Pest of vegetables:

- a) Cabbage, Cauliflower, Khol-Khol, Radish & other cruciferous Vegetable:**
I) Major: Diamond back moth, Cabbage Semi lopper mustard aphid .
II) Minor: Leaf Webber & Cabbage borer.
- b) Brinjal**
I) Major: Shoot & Fruit borer, Jassids aphids.
II) Minor: Stem borer, Trigid, borer Melon fruit fly. fly.
- c) Tomato:**
I) Major: Fruit borer, Aphids, Cotton white fiy.
II) Minor: Thrips, Leaf hopper, Mealy bug.
- d) Potato:**
I) Major: Tuber moth, Golden cyst nematode.
II) Minor: Aphid, Thirips.
- e) Ladys finger:**
I) Major: spotted bollworm, Aphids, Cotton Jassids.
II) Minor: Leaf roller.
- f) Cucurbits:**
I) Major: Pumpkin beetle (red, black & yellow),fruit fly.
II) Minor: Blister beetle, red veg mite, aphids,
- g) Sweet potato:**
I) Major: Weevils.
- h) Sugar beet:**
I) Major: Army worm, Leaf Webber, rodents
II) Minor: Painted bug, Cutworm, Aphids, Thrips.
- i) Leafy vegetables:** (Coriander, Spinach, Fenugreek, Lettuce, Amaranthus etc)
I) Major: aphids, Flea beetle, Stem weevil, Leaf minar.
II) Minor: Gross hopper, Leaf hopper.

B) Pests of fruits & fruit Trees:

- a) Mango:**
I) Major: Mango hoppers, stem borer, giant mealy bug, stone Weevil, fruit fly
II) Minor: leaf and shoot gall insects, red ants, termites.
- b) Grape vine:**
I) Major: Thirps, flea beetle, Mealybugs.
II) Minor: Leafhopper, Two spotted spider mite
- c) Chicku:**
I) Major: Leaf Webber, Mealy bugs, Chiku moth
- d) Pomogranate:**
I) Major: Anar butterfly, Fruit sucking moth.
II) Minor: Shoot borer, Mites, Thrips, Scale insects
- e) Citrus:**
I) Major: Black fly, Psylla, mites, cottony cushion scale.
II) Minor: Fruit sucking moth, Lance nematode, Aphid.
- f) Apple:**
I) Major: Wooly apple aphid, (*Eriosoma* spp), peach leaf curl aphid.
- g) Guava:**
I) Major: Guava fruit fly, Mealy bugs, Spiraling white fly.
II) Minor: Scale insect.
- h) Papaya:**
I) Major: Aphids & Cotton white fly.
II) Minor: Red spider mite.
- i) Banana:**
I) Major: Aphid, Turgid bug & Burrowing nematode.
II) Minor: Root stock weevil Snails.

- j) **Fig:** I) Major: Jassids, Mealybugs.
II) Minor: Fig borer, Fruit fly.
- k) **Ber:** I) Major: Fruit fly, Fruit borer, Jassid.
II) Minor: Ber beetle.
- l) **Pin apples:** I) Major: Thrips.
- m) **Jack Fruit:** I) Major: White tailed mealy bug, Bark borer.
II) Minor: Pink waxy scale.

Unit-III

(15)

A) Fungal diseases of vegetable crops, their symptoms, Life cycle, nature of damage & control measures:

- a) Tomato: a) Blight- *alternaria solani*
b) Wilt- *Fusarium oxysporium*.
- b) Potatoes: a) Wart of potato- *Synchytrium endobioticum*.
b) Black scurf of tubers –*Rhizoctonia solani*
- c) Bhendi: a) Powdery mildew- *Oidium spp*
b) Cercospora disease- *Cercospora spp*.
- d) Chilies: a) Powdery mildew- *Oidium spp*.
b) Leaf spot disease- *Cercospora capsica & Alt. solani*
- e) Cruciflies: a) Downey mildew- *Peronospora parasitic*.
b) Whit rust- *Alb. candida*.
- f) Onion: a) Downey mildew- *Peronospora destructor*, Smut troughs *coulee*.
- g) Peas a) Downey mildew- *Peronospora pisi*.
- viii) Sweet potatoes- Dry Rot- *R.nigricans*.
Fuserial wilt, Pox or soil rot, Java black rot.
- h) Cucurbitaceous vegetables: Downey mildew, Powdery mildew,
Fruit rot: *Pythium rot*, Stem rot: *Diplodia*, Root rots, Seedling blight,
Wilts, Anthracnose.
- i) Sugar beet: Leaf spot (*Cercospora*, *Ramularia*), Black root disease, Downey mildew, Foliage *Rhizoctonia blight*, Rusts *Fusarium yellows Sclerotium root rot*, Other root rot (Storage), *texas root rot*.
- j) Peas, beans & other leafy vegetables:
(*Coriander*, *Spinach* *Fenugreek*, *Amaranths*, *Lettuce* etc)
Rot-Stem, root & fruit, anthracnose, Powdery & Downey mildews,
Blights wilts.

B) Fruit trees & Fruit diseases:

- i) Mango: a) Anthracnose of mango- *Colletorichum gleosporioides*.
b) Fruit rot of mango- *gleosporium ampelofagum*
- ii) Apples- Rots: Blue, black, soft, bitter, pink of fungal origin, Powdery Mildew, apple scab, Whit root rot.
- iii) Guava- Fruit Rot *Gloeosporium pseudo Delacroix*
Black spot disease- *Coll. psidi Curzi*
- iv) Grapes: Anthracnose- *Gloe. amplexophagum (Pass) Sacc. (El.ampelina)*
Bitter rot- *Melanconium fulgenium*

- Botrytis rot- botrytis cinerea.
Downy and powdery mildew, Black root of fruits, Cotton root Rot, Wilts, foot root.
- v) Citrus, lemon & Oranges: Brown rot – Gloe. Citri
Brown watery rot –Phytopthera palmivora
Orange rot- F.moniliformis, Orange fruit rot
- vi) Coconut: Gray leaf spot – pestalotia palmivora
Wilt- Ganoderma lucidum
- vii) Chickoo: Leaf spot- Phamoploeospora indica
- viii) Papaya: Anthracnose- Coll. Gloeosporioidus (Penz) Sacc, Wilt, oily spot
Fruit rot- R nigricaus sigotoca. Nigerian, Trichladioum chartroom
- ix) Banana: Fruit rot –Coll. Musae f. roseum (Diamond spot fruit rot)
Leaf spot –Alt. Alternata, Deightoniella torulora, F.oxysporium
Nigrospora oryzye.
- x) Pomegranate: Brown rot (Storage) –Phomapsis varsoniana Sacc, wilt,
nlyspot.
- xi) Figs: Fruit decay- R. Nigricans Ehr
Pink rot- Trichotheium roseum (Pers.) Link
- xii) Ber: Foliage disease & fruit storage diseases.

Unit-IV

(15)

A) Disease plantation trees:

- Coconut – Bud rots & wilts (Ganoderma spp.)
- Rubber- Foliage diseases & seedling diseases.
- Coffee- Rust, Leaf spot & Berry anthracnose.
Tea- Blister & rots
- Cashew nut- Foliage diseases & storage's spoilage.

B) Forest trees :

- Teak Rust & powdery mildew
- Sisso: Rust, powdery mildew
- Bamboo: Rust & star spot diseases.
- Eucalyptus: Foliage diseases & seedling diseases at nursery.
- Santalum: Powdery mildew & Asterina diseases.
- Lacuna: Seedling blights.

C) Diseases of Ornamental plants:

- Roses: Black spot, Powdery mildew. Rust brown, Cankers, anthracnose.
- Gladiolus: Rot & corm, root, leaf, flower blights.
- Chrysanthemum: Powdery mildew, rust, leaf spot, Wilt, Petal blights.

Reference Books:

- Agriculture pest of India and Southeast Asia by A. S. Atwal.
- A textbook of applied Entomology by K. P. Srivastava.
- Plant pathology by G.N.Agrios.

SEMESTER- IV

PRACTICAL- VII: BASED ON THE PAPERS XIII& XV.

Pesticide synthesis (Chemistry)

1. Preparation of 2,4-D.
2. Dimethyl Phthalate
3. synthesis of Phthalimide
4. Benzal acetophenone
5. 1-Naphoxyacetic acid
6. Phenyl urea
7. Preparation p-Nitrovacetanilid.
8. Phenyl urea
9. Phthyl hydrazide
4. Preparation of phthalanilic acid.
5. Preparation of Ziram.
- 6.Preparation of salicylanilide.
- 7.Preparation of Nabam, Ferbam, zineb, maneb etc.
- 8.Colorimetric determination of parathion.
- 9.Colorimetric determination of vanadium in soil sample.
- 10.Ion exchange chromatographic analysis of copper, Zn and Cobalt.
- 11.Estimation of vanadium content from soil.
- 12.Determination of Quinolphos content.
- 14.Isolation of caffeine from tea dust.
14. Isolation of B-carotene from carrots, limonene from citrus fruits,.Isolation of eujenol from clove oil.
15. Isolation of limonene from citrus fruits.
- 16.Interpretation of IR, PMR & spectra of pesticides.
- 17.Any other suitable experiment may be added when required.

SEMESTER-IV

PRACTICAL- VIII:

LIFE SCIENCE (BOTANY&ZOOLOGY)

(Zoology)

- 1.Determination of LC50 and LC90 in given insects.
- 2.Rearing of two to three pests in laboratory. (As per syllabus)
- 3.Field collection of pests stages and its submission.
- 4.Field visits(Minimum four) & field diary.
- 5.Large scale production of
 - a. Bacillus thuriengnis
 - b.Beauveria bassiana
 - c.Apenteles sp.
 - d.Bracon sp.
 - e.Nematodes.

(Botany)

- 6.Estimation of protein content under pathogenesis.
 - 7.Estimation of Ascorbic acid under pathogenesis.
 - 8.Estimation of carbohydrates from healthy and infected leaves.
 - 9.Biological oxygen demand and dissolved oxygen.
 - 10.Chemical oxygen demand.
 - 11.Study of Karl-Fisher titration.
 - 12.Study of fungal diseases(at least one/two of the plants as per syllabus.)
 - a. Field diseases of fruits and fruit trees.
 - b. Plantation crops
 - c. Forest trees
 - d.Ornamentals
 - 13.Collection of diseases from field and its submission.
 - 14.Field visits.
 - 15.Estimation of Lycopene contents
 - 16.Any suitable experiment may be added whenever necessary
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