JR Plant Protection Expert (JPPE)
Core Qualification File Syllabus

Details of Theory Syllabus

Sl. No.	CONTENT	DETAILS
1.	Introduction to biotic and abiotic stresses on plant (7 hrs)	1.1. Definition and importance of plant diseases, insect -pests and weeds in plant health management. 1.2. Biotic factors (fungi, bacteria, virus, phytoplasma, spiroplasma, viroids, algae, protozoa, phenarogramic parasites), pests (insects, mites, nematodes, birds, mammals, molluscs or mollusks and crabs with examples) and weeds affecting plant health 1.3. Landmark historical events of insect- pests and diseases outbreak and its causes 1.4. Useful and harmful effects of weeds 1.5. Abiotic factors include environmental factors (High and low temperatures, drought and flood, inadequate oxygen), air pollutants (ozone, PAN, SO_2, NO_2 etc.), and nutritional deficiency 1.6. Classification of plant diseases and insect-pests with examples.
2	General characteristics and structures of fungi, bacteria and viruses (6 hrs)	2.1 Brief idea about general characteristics and structures of fungi, bacteria and viruses. 2.2 Brief characteristics of most important fungal (*Pythium, Phytophthora, Peronospora, Plasmopara, Albugo, Erysiphe, Puccinia, Ustilago, Helminthosporium,Alternaria, Pyricularia, Cercospora, Colletotrichum, Fusarium, Sclerotium, Phomopsis, Septoria*) genera and plant diseases caused by them. 2.3 Brief characteristics of most important bacterial (*Xanthomonas, Pseudomonas, Ralstonia, Erwinia, Agrobacterium, Phytoplasma*) genera and the diseases they cause.
3	Plant disease management principles and approaches (7 hrs)	3.1 Principles of plant disease management – Avoidance, eradication, exclusion, protection, resistance and therapy 3.2 Brief idea about biological control and integrated disease management. 3.3 Classification of fungicides(major groups) 3.4 Antibiotics in plant disease management 3.5 Fungicide formulations and modes of application 3.6 New generation fungicides 3.7 Compatibility of agro-chemicals
4	Very brief diagnostic symptoms and management of important diseases of field crops, fruits, vegetables and flowers (12 hrs)	4.1 Diseases of Rice – brown spot, blast, sheath blight and bacterial leaf blight 4.2 Diseases of Wheat – rusts, loose smut and leaf blight 4.3 Maize –Leaf blight 4.4 Green gram/ Black gram- powdery mildew, anthracnose, mosaic 4.5 Diseases of oilseed crops- Alternaria leaf spot, black vein, club root of mustard; Tikka disease, stem/collar rot of groundnut; sesamum phyllody 4.6 Diseases of Jute- stem rot 4.7 Diseases of Potato and tomato – Late blight, early blight and bacterial wilt of potato and tomato, leaf curl of tomato 4.8 Diseases of Brinjal – Phomopsis blight, bacterial wilt, little leaf 4.9 Diseases of chilli, cucurbits and bhindi- Anthracnose/ die back of chilli ; downy and powdery mildew of Cucurbits (Cucumber,Ridge

		gourd, Pumpkin, Bottle gourd); Yellow vein mosaic of bhindi 4.10 Diseases of fruit crops – anthracnose, malformation, black tip of Mango; sigatoka, wilt, bunchy top of Banana ; wilt of Guava , Citrus canker 4.11 Diseases of floricultural crops- leaf spot and petal rot of Marigold; stem rot of Tuberose; black spot of Rose –,die back, Chrysanthemum –leaf blight 4.12 Diseases of betelvine– Colletotrichum leaf spot and leaf rot 4.13 Diseases of ginger – rhizome rot
5	General characteristics of insect- pests and weeds (12 hrs)	5.1 General characteristics of the Phylum - Arthropoda and Nematoda, Class - Insecta and Arachnida. 5.2 Different body parts and salient external morphological features of an ideal insect – grass hopper. 5.3 Metamorphosis of insect – simple and complete metamorphosis. 5.4 Different life stages of insect- egg, larva (caterpillar/grub/maggot), pupa and adult. 5.5 Name of mouth parts of plant feeding insects. 5.6 Insect order injurious to crops – Orthoptera, Isoptera, Hemiptera, Lepidoptera, Coleoptera, Hymenoptera and Diptera with example of one or two pests from each order 5.7 Characterization, classification, propagation and dissemination of weeds
6	Insect pest management principles and approaches (8 hrs)	6.1 Principles of pest management, Cultural, mechanical, physical, legislative, resistance, biological, microbial, botanical, chemical, biorational and other innovative approaches of pest management with outstanding examples. 6.2 Brief idea about biological and microbial control. 6.3 Insecticides – chemical and botanicals; forms, formulations and classification of chemical insecticides – based on the toxicity categories, mode of entry, mode of action and chemical nature. Waiting period of commonly used insecticides. Warning symbols and signals, pesticide application methods, types of spray 6.4 Safe handling of pesticides, symptoms of pesticide poisoning/toxicity, first aid and antidotes for treating pesticide poisoning.
7	Integrated pest management (3 hrs)	7.1 Definition, significance, Economic Threshold Level (ETL), Economic Injury Level (EIL), Different categories of insect pests. 7.2 Difference between harmful and beneficial insects. 7.3 Tools /components of integrated pest management (IPM).
8	Very concise idea about the nature of damage, spread and management of important pests of field crops, fruit crops, vegetable crops and flowering crops (12 hrs)	8.1 Pests of Rice – Stem borer, leaf folder, gall midge, green leaf hopper, brown plant hopper, white backed plant hopper, gundhi bug, panicle mite, root-gall; 8.2 Pests of Wheat -stem borer, termite; 8.3 Pests of Maize - Fall army worm, stem borer; 8.4 Pests of Pulses – aphid, pod borer complex; 8.5 Pests of Oilseed crops- Mustard - aphid, diamond black moth, flea beetle, head borer (*Spodoptera, Helicoverpa*); Groundnut - leaf miner; Sesamum – leaf and pod caterpillar; 8.6 Pests of Jute - Bihar hairy caterpillar; 8.7 Pests of Potato - cutworm, aphid. 8.8 Pests of Vegetable crops-Tomato - fruit borer, leaf miner; Brinjal –

		fruit and shoot borer, epilachna beetle, root-knot nematode; Chilli – thrips, mite, whitefly; Cucurbits – red pumkin beetle, fruit fly; Bhindi - leaf hopper, whitefly, red spider mite. 8.9 Pests of spice crops- Ginger/Turmeric- shoot borer. Onion – thrips. Garlic- dry bulb mite (*Aceriatulipae*); 8.10 Pests of Fruit crops- Mango – mango hopper, fruit fly; Banana – pseudostem weevil, fruit and leaf scaring beetle; Litchi – leaf roller and fruit borer; Guava – fruit fly, fruit borer; Citrus – leaf miner, butterfly; 8.11 Pest of Floricultural crops-Marigold - red spider mite, Rose - thrips; Chrysanthemum – aphid; Tuberose - foliar nematode (*Aphelenchoidesbesseyi*)
9	Methods and approaches of weed management (5 hrs)	9.1 Mechanical, cultural, biological and chemical methods 9.2 Herbicides – Classification, mode of action and application 9.3 Integrated weed management
Total		**72 hrs**

Detail of Practical Syllabus

SL NO	CONTENT	DETAILS
1	Acquaintance with biotic stresses on plants (14 hrs)	1.1. Microscopic observation (permanent slide) of different fungal genera 1.2. Study of different body parts and appendages of grass hopper / cockroach 1.3. Study of cutting chewing and sucking type of mouth parts (In absence of live specimen, coloured printed photograph could be used)
2	Study of different types of symptoms caused by pathogen and insect pests (22 hrs)	2.1 Studies of different types of symptoms - spot, blight, rot (root rot, stem rot, fruit rot, flower rot), powdery mildew, downy mildew, rust, smut, galls, canker, blight (In absence of live specimen, coloured printed photograph could be used) 2.2 Study of different damage symptoms caused by insect: White head, dead heart, onion leaf, stem-, shoot- and fruit borer, root feeder, bark eating caterpillar, leaf minor, foliage feeder, gall, knots. 2.3 Identification of different types of diseases and pests of field crops, fruits vegetables under field condition
3	Survey and monitoring of different diseases, insect pests and weeds (12 hrs)	3.1 Assessment of incidence and severity of (2-3) most important plant diseases of the locality 3.2 Use a light trap/sticky trap/pheromone trap for monitoring and mass trapping of the insect pests. 3.3 Studies on common weeds of the location and their seasonality (summer, rainy, winter)
4	Collection and preservation of diseases, weeds and insect pest samples (8 hrs)	4.1 Procedure for collection and preservation disease and pest samples 4.2 Collection of disease specimen (8 – 10 in no.), weeds (8 – 10 in no.) for herbarium and insect preserved (8 – 10 in no.) in dry/ formalin (take 10 ml formaldehyde and dissolve in 90 ml distilled water)
5	Chemicals in plant diseases, insect pests and weed management (12 hrs)	5.1 Demonstration of some commonly available fungicides, insecticides, herbicides, rodenticides, plant protection equipments. 5.2 Study the modes of application of different pesticides - seed treatment (dry and wet) soil treatment, spraying, dusting. 5.3 Determination of toxicity level of pesticide based on colour of label red blue, orange, green 5.4 Calculation of fungicides, herbicides and insecticides required for spraying in agricultural field and spray volumes and its spraying. 5.5 Safe handlings, application and storage of agro-chemicals 5.6 Preparation of Bordeaux mixture (Copper sulphate, lime and water)
6	Biological approaches for management of	6.1 Identification and use of parasitoids and predators for biological control of the insect- pests

	insect pest and diseases (8 hrs)	6.2 Study the modes of application of different bioagents - seed treatment, seedling treatment and nursery and main field soil application
7	Project (20 hrs)	Two numbers each of 10 hrs
Total		**96 hrs.**

Details of Project (Any two)

Sl. No.	Content (Any two, each 12 hrs)	Details
1.	Project I	Mass production of biocontrol agents
2.	Project II	Preparation of indigenous traps with methyl euginol lures for year round monitoring of mango fruit fly
3.	Project III	Use of indigenous yellow sticky trap for seasonal / year round monitoring of whitefly
4.	Project IV	Study on dynamics of weed flora in any major crop of the locality

OUTCOMES

Outcomes to be assessed	Assessment criteria for the outcome
1. Identify and recognize the different biotic and abiotic stresses on plants	(1.1) Recognize the different parts of the microscope, apply the safety procedures. (1.2) Recognize different fungal genera based on microscopic observations. (1.3) Identify different types of mouth parts of insects based on microscopic observations. (1.4) Demonstrate preparation of temporary/r permanent slides for microscopic observation. (1.5) Distinguish different types and grouping of biotic and abiotic factors affecting plant health. (1.6) Note the Microscopic observation (permanent slide) of different fungal genera.
2. Identify and execute the plant disease management system.	(2.1) Identify different genera of fungi based on important characteristics. (2.2.) Identify different genera of bacteria based on important characteristics. (2.3) Compare the differences between insect and mite. (2.4) List out the name of the insect pests of different orders. (2.5) Explain morphological and general characteristics of important weed genera. (2.6) Examine whether the trainee can able to name the weeds based on morphological feature (gross morphology). (2.7) Describe the characterization, and classification of weeds. (2.8) Explain the life cycle and different life stages of insect- egg, larva (caterpillar/grub/maggot), pupa and adult, and damaging stage. (2.9) State the propagation of different types of weeds. (2.10) Describe the dissemination of different types of weeds.
3. Plan the Diagnosis and management of important plant diseases, insect pests and weeds	(3.1) Identify the diseases of important field crops. (3.2) Identify the insect pests of important field crops. (3.3) Identify the diseases of important horticultural crops. (3.4) Select the insect pests of important horticultural crops. (3.5) Recognize the different symptoms of important fungal diseases.

	(3.6) Identify the different symptoms of important bacterial diseases. (3.7) Identify the different symptoms of important viral diseases. (3.8) Plan, select and execute different management strategies against seed borne diseases. (3.9) Plan, select and execute different management strategies against soil borne diseases. (3.10) Describe different management strategies against air borne diseases. (3.11) Describe different management strategies against sucking insect-pests. (3.12) Describe different management strategies against lepidopteron insect-pests. (3.13) Recognize the probable reasons of atypical symptoms (wilting / leaf curling /yellowing of leaves etc.) observed in plants. (3.14)Demonstrate the difference between fungal and bacterial wilt. (3.15) Differentiate between viral and nutrient deficiency symptoms.
4. Schedule and monitor survey, collection and preservation of diseases and insect pest samples.	(4.1) Demonstrate the wet preservation of the diseased plant samples. (4.2) Demonstrate the dry preservation of the diseased plant samples. (4.3) Demonstrate the preservation of the insect-pest samples. (4.4) Explain the difference between real time and roving survey. (4.5) Demonstrate different types of traps for monitoring of insects. (4.6) Assess the incidence and severity of most important plant diseases. (4.7) Illustrate the name of weeds of some important crops of the locality and their time of occurrence. (4.8) Demonstrate project work on installation of pheromone traps/ yellow sticky traps for monitoring of insect pests.
5. Identify principles, methods and approaches of disease, insect pests and weed management	(5.1) List out the name of some commonly available fungicides, insecticides, acaricides, nematicides, herbicides and rodenticides of this locality. (5.2) Determine toxicity level of agrochemicals based on colour of label like, red blue, orange, green etc. (5.3) Calculate the fungicides, herbicides and insecticides required for spraying in agricultural field. (5.4) Demonstrate the physical compatibility of pesticides. (5.5) Explain the different steps on safe handlings, application and storage of agro-chemicals. (5.6) Describe the different methods of application of agro-chemicals for management of weeds, insect-pests and plant diseases. (5.7) Describe the different formulation of pesticides. (5.8)Demonstrate the preparation of Bordeaux mixture (5.9) Describe basic first aid and antidotes for treating pesticide poisoning. (5.10) Explain the mode of action of different agro-chemicals (herbicides/insecticides/fungicides etc.) (5.11) Demonstrate the method of seed treatment through agro-

	chemicals. (5.12)Explain the ideal characteristics of fungicides.
6. Demonstrate the mass production of bioagents and use of traps for disease and insect pest management	(6.1) Recall the name some of the bio-control agents, parasitoids, predators etc. (6.2) Implement the quality control of bio-formulated product. (6.3) Describe project work on mass production of bio-agents. (6.4) Execute project work on the preparation of indigenous traps with methyl euginol lures and study the population dynamics of mango fruit fly through out the year. (6.5) Execute the project work on the use of indigenous yellow sticky trap and study its efficacy through seasonal /year round monitoring (whitefly).