Objective
PLANT PATHOLOGY
MCQs for Competitive Examinations
- ICAR-ARS/NET
- JRF
- SRF
- M.Sc.
- Ph.D.
Objective Plant Pathology

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Education, research and extension, are the three pillars of agriculture in the universities. Education is the first and foremost area that opens up the mind and nurtures creativity leading to the detailed study through research and translating the outcome of research into practical knowledge, which then can be used in the field, in the form of extension services to benefit the farmers. Formulation of appropriate educational material is the foundation of learning a subject.

Knowledge of Plant Pathology is required to prevent crop losses worldwide to reduce the threat to food security and economy of the nations.

This book provides a suitable approach for preparation of job oriented entrance tests and competitive examinations. The questions are formulated based on the content of various books recommended on Plant Pathology. Besides books, several journals and review articles have also been consulted to keep the readers abreast with the present scenario on the subject. This book contains questions to ponder over the subject and tests a person’s knowledge. The readers will be able to test their preparation as well as gain new insight through the updated information provided in this book. With more than 3000 multiple choice questions on various aspects of the subject, this book can serve as a repository of objective questions in Plant Pathology. Solved question papers on Plant Pathology and Botany (M.Sc and Ph.D entrance examinations) from reputed institutes are also appended in this book.

I sincerely acknowledge the contribution of all the authors listed in the Appendix and those who might be missed inadvertently. Any constructive suggestion or comment to improve this book are highly welcome.

Susanta Banik
SYLLABI OF VARIOUS COMPETITIVE EXAMINATIONS
ON PLANT PATHOLOGY

1. Syllabus of ICAR-ARS/NET (PLANT PATHOLOGY)

Unit 1: History and Principles of Plant Pathology


Unit 2: Laboratory and Analytical Techniques


Unit 3: Physiological and Molecular Plant Pathology


Unit 4: Mycology


Unit 5: Plant Bacteriology


Unit 6: Plant Virology


Unit 7: Plant Disease Epidemiology


Unit 8: Phanerogamic parasites and Non-parasitic Diseases

Diseases caused by Phanerogamic parasites and their management. Diseases due to unfavourable soil environment, drought and flooding stress etc. Nutritional deficiencies. Primary /secondary air pollutants and acid rain.

Unit 9: Fungal Diseases of Crop Plants

Fungal diseases of cereals, millets, oilseeds, pulses, fruits, vegetables, plantation, fiber, spices and ornamental crops with special reference to etiology, disease cycle, perpetuation, epidemiology and management. Post harvest diseases in transit and storage; aflatoxins and their integrated management.

Unit 10: Bacterial and Viral Diseases of Crop Plants

Crop diseases of cereals, pulses, oilseeds, vegetables, fruits, plantation and fiber crops caused by bacteria, viruses, viroids, phytoplasmas and other fastidious prokaryotes. Mode of transmission and pathogen vector relationships. Epidemiology and management.

Unit 11: Management of Plant diseases

General principles of plant quarantine. Exotic pathogens and pathogens introduced into India. Sanitary and phytosanitary issues under WTO, TRIPS and PRA. Genetic basis of disease resistance and pathogenicity: gene for gene hypothesis; parasite mediated frequency -dependent selection concept of QTL mapping; breeding for disease resistance. Production of disease free seeds and planting materials. Seed certification. Chemical nature and classification of fungicides and antibiotics: their bioassy and compatibility with other agricultural chemicals; resistance to fungicides/antibiotics; effect on environment. Spraying and dusting equipments, their care and maintenances. Important cultural practices and their role in disease management, solarization, integrated disease management. Microorganisms antagonistic to plant pathogens in soil, rhizosphere and phyllosphere and their use in the control of plant diseases; soil fungistasis. Plant growth promoting Rhizobacteria.
2. Syllabus of IARI Ph.D entrance examination (PLANT PATHOLOGY)

Landmarks and pioneers of plant pathology; theory of microscopy and staining; structural and physiological differences amongst fungi, bacteria, rickettsias, mycoplasmas, viruses and viroids; principles of culturing and preservation of pathogens; characteristic symptoms; host-parasite relationships; symbiosis; economically important diseases of crop plants induced by fungi, bacteria, rickettsias, mycoplasmas, viruses and viroids; phanerogamic parasites, non-parasitic diseases; nutrition, growth, reproduction, life cycle, ultrastructure, genetics and classification of microorganisms; Mendelian principles; cell structure; seed germination; origin of life and evolution; beneficial microorganisms including mycorrhiza; variation in phytopathogens and their ecology; introductory epidemiology; transmission and detection of pathogen; host resistance; seed-borne pathogens and plant quarantine; chemical and biological control, integrated management practices

3. ICAR-JRF Plant Science

UNIT-I: Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeonpea, sugarcane, groundnut, tomato, potato and mango. Major soils of India, role of NPK and their deficiency symptoms.

UNIT-II: Structure and function of cell organelles; mitosis and meiosis; Mendelian genetics; elementary knowledge of photosynthesis; respiration, and transpiration; structure and functions of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management.

UNIT-III: Characteristics of prokaryotic and eukaryotic organisms, differences between fungi, bacteria, mycoplasmas and viruses; physical and chemical basis of heredity; chromosome structure; genes/operon concept; protein biosynthesis; transformation, recombination, heterosis; Elements of economic botany; integrated diseases management; sterilisation, disinfection and pasteurization; Koch’s postulates; aetiological agents of rusts, smuts, powdery/downy mildews, wilts, yellows, mosaic, necrosis, enations, blights and witches-broom; pH, buffer, vitamins, role of plant hormones in seed germination and dormancy; pollination/fertilization in flowering plants; methods of seed testing; breeders, foundation and certified seeds; seed production in self and cross pollinated crops, nitrate assimilation; biological nitrogen fixation and other uses of microorganisms in agriculture.

UNIT-IV: Food and industry; composting and biogas production. Important rural development programmes in India; organizational set up of agricultural research, education and extension in India.

4. ICAR-All India Entrance Examination for Admission (AIEEA)-UG AGRICULTURE

Unit-1: Agro meteorology, Genetics and Plant Breeding, Biochemistry and Microbiology

Agrometeorology: Elements of Weather-rainfall, temperature, humidity, wind velocity, Sunshine weather forecasting, climate change in relation to crop production.
Genetics & Plant Breeding: (a) Cell and its structure, cell division-mitosis and meiosis and their significance (b) Organisation of the genetic materials in chromosomes, DNA and RNA (c) Mendel’s laws of inheritance. Reasons for the success of Mendel in his experiments. Absence of linkage in Mendel’s experiments. (d) Quantitative inheritance, continuous and discontinuous variation in plants. (e) Monogenic and polygenic inheritance. (f) Role of Genetics in Plant breeding, self and cross-pollinated crops, methods of breeding in field crops-introduction, selection, hybridization, mutation and polyploidy, tissue and cell culture. (g) Plant Biotechnology-definition and scope in crop production.

Biochemistry: pH and buffers, Classification and nomenclature of carbohydrates; proteins; lipids; vitamins and enzymes.

Microbiology: Microbial cell structure, Micro-organisms- Algae, Bacteria, Fungi, Actinomycetes, Protozoa and Viruses. Role of micro-organisms in respiration, fermentation and organic matter decomposition

Unit-2: Livestock Production

Scope and importance: (a) Importance of livestock in agriculture and industry, White revolution in India. (b) Important breeds Indian and exotic, distribution of cows, buffaloes and poultry in India.

Care and management: (a) Systems of cattle and poultry housing (b) Principles of feeding, feeding practices. (c) Balanced ration-definition and ingredients. (d) Management of calves, bullocks, pregnant and milch animals as well as chicks crockrels and layers, poultry. (e) Signs of sick animals, symptoms of common diseases in cattle and poultry, Rinderpest, black quarter, foot and mouth, mastitis and haemorrhagic septicaemia coccidiosis, Fowl pox and Ranikhet disease, their prevention and control. Artificial Insemination: Reproductive organs, collection, dilution and preservation of semen and artificial insemination, role of artificial insemination in cattle improvement. Livestock Products: Processing and marketing of milk and Milk products.

Unit-3: Crop Production

Introduction: (a) Targets and achievements in foodgrain production in India since independence and its future projections, sustainable crop production, commercialization of agriculture and its scope in India. (b) Classification of field crops based on their utility-cereals, pulses, oils seeds, fibre, sugar and forage crops. Soil, Soil fertility, Fertilizers and Manures: (a) Soil, soil pH, Soil texture, soil structure, soil organisms, soil fertility and soil health. (b) Essential plant nutrients, their functions and deficiency symptoms. (c) Soil types of India and their characteristics. (d) Organic manure, common fertilizers including straight, complex, fertilizer mixtures and biofertilizers; integrated nutrient management system. Irrigation and Drainage: (a) Sources of irrigation (rain, canals, tanks, rivers, wells, tubewells). (b) Scheduling of irrigation based on critical stages of growth, time interval, soil moisture content and weather parameters. (c) Water requirement of crops. (d) Methods of irrigation and drainage. (e) Watershed management Weed Control: Principles of weed control, methods of weed control (cultural, mechanical, chemical, biological and Integrated weed management).

Crops: Seed bed preparation, seed treatment, time and method of sowing/planting, seed rate; dose, method and time of fertilizer application, irrigation, interculture and weed control; common pests and diseases, caused by bacteria, fungi virus and nematode and their control, integrated pest management, harvesting, threshing, post harvest technology: storage, processing and marketing of major field crops-Rice, wheat, maize, sorghum, pearl millet, groundnut, mustard, pigeon-pea, gram, sugarcane, cotton and berseem.
Unit-4: Horticulture

(a) Importance of fruits and vegetables in human diet, Crop diversification & processing Industry.
(b) Orchard-location and layout, ornamental gardening and kitchen garden. (c) Planting system, training, pruning, intercropping, protection from frost and sunburn. (d) Trees, shrubs, climbers, annuals, perennials-definition and examples. Propagation by seed, cutting, budding, layering and grafting. (e) Cultivation practices, processing and marketing of: (i) Fruits - mango, papaya, banana, guava, citrus, grapes. (ii) Vegetables - Radish, carrot, potato, onion, cauliflower, brinjal, tomato, spinach and cabbage. (iii) Flowers - Gladiolus, canna, chrysanthemums, roses and marigold. (f) Principles and methods of fruit and vegetable preservation. (g) Preparation of jellies, jams, ketchup, chips and their packing.
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