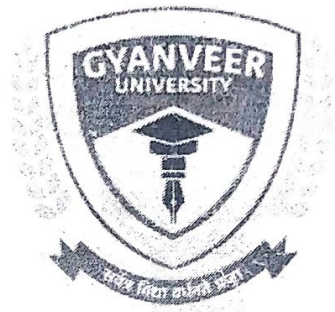


GYANVEER UNIVERSITY, SAGAR (M.P.)

Academic Year: 2023-2024

M.Sc. (Ag) Plant Pathology



Syllabus & Scheme

Semester – I & II

School of Agricultural Science





GYANVEER UNIVERSITY, SAGAR (M.P.)
Scheme of Examination M.Sc (Agriculture-Plant Pathology) II Semester
School of Agricultural Science (Academic Session 2023-24)
Subject wise distribution of marks and corresponding credits

S. No.	Subject Type	Course	Subject Code	Paper Name	Maximum Marks Allotted									Total Marks	Contact Periods Per week			Credit Allotments	Total Credits
					Theory Slot				Practical Slot						L	T	P		
					End Term Exam	Internal Assessment Class test (Descriptive & Objective)/Assignment/Seminar			Internal Assessment			External Assessment							
						Final Exam	Internal Assessment I	Internal Assessment II	Internal Assessment III	Class test/ Interaction	Attendance	Practical/ Presentation/Lab Record	Viva Voce						
1	Major Course	M.Sc (Agriculture-Plant Pathology)	GUPP-511T	Plant Bacteriology(Theory)	70	15	15	15	-	-	-	-	-	100	2	0	0	3(2+1)	2
2	Major Course		GUPP-511P	Plant Bacteriology(Practical)	-	-	-	-	10	10	10	10	10	50	0	0	1		
3	Major Course		GUPP-512T	Integrated Disease Management(Theory)	70	15	15	15	-	-	-	-	-	100	2	0	0	3(2+1)	2
4	Major Course		GUPP-512P	Integrated Disease Management(Practical)	-	-	-	-	10	10	10	10	10	50	0	0	1		
5	Major Course		GUPP-513T	Mushroom Production Technology(Theory)	70	15	15	15	-	-	-	-	-	100	2	0	0	3(2+1)	2
6	Major Course		GUPP-513P	Mushroom Production Technology(Practical)	-	-	-	-	10	10	10	10	10	50	0	0	1		
	Major Course		GUGPB-513T	Maintenance Breeding & Concept of Variety Release & Seed Production (Theory)	70	15	15	15	-	-	-	-	-	100	2	0	0	2(1+1)	1
	Major Course		GUGPB-513P	Maintenance Breeding & Concept of Variety Release & Seed Production (Practical)	-	-	-	-	10	10	10	10	10	50	0	0	1		
7	Major Course		GUPP-514T	Diseases of Field and Medicinal Plants(Theory)	70	15	15	15	-	-	-	-	-	100	1	0	0	2(1+1)	1
8	Major Course		GUPP-514P	Diseases of Field and Medicinal Plants(Practical)	-	-	-	-	10	10	10	10	10	50	0	0	1		
9	Minor Course		GUGPB-512T	Biotechnology for Crop Improvements(Theory)	70	15	15	15	-	-	-	-	-	100	2	0	0	3(2+1)	2
10	Minor Course		GUGPB-512P	Biotechnology for Crop Improvements(Practical)	-	-	-	-	10	10	10	10	10	50	0	0	1		
11	Supporting Course		GUSTAT-511T	Design of Experiments(Theory)	70	15	15	15	-	-	-	-	-	100	2	0	0	3(2+1)	2
12	Supporting Course		GUSTAT-511P	Design of Experiments(Practical)	-	-	-	-	10	10	10	10	10	50	0	0	1		
13	Non Credit Course	GUPGS-511	Library and Information Services	No Credits															
14	Non Credit Course	GUPGS-512	Intellectual Property and its Management in Agriculture	No Credits															

Total of Creditd is = 19

ote* Allotment of Marks for Internal Assessment for theory portion is Best of Two / either of two and addition of them.

*R: Remedial course;

** NC - Non Gradial Course



M.Sc. (Ag.) PLANT PATHOLOGY

Course Contents

(SECOND SEMESTER)

Course Title: GUPP-511T BACTERIOLOGY (Theory) 3(2+1)

OBJECTIVE

To acquaint with plant pathogenic prokaryote (procarya) and their structure, nutritional requirements, survival and dissemination.

THEORY

UNIT I

History and introduction to phytopathogenic procarya, viz., bacteria, MLOs, spiroplasmas and other fastidious procarya. Importance of phytopathogenic bacteria. Evolution, classification and nomenclature of phytopathogenic procarya and important diseases caused by them.

UNIT II

Growth, nutrition requirements, reproduction, preservation of bacterial cultures and variability among phytopathogenic procarya. General biology of bacteriophages, L form bacteria, plasmids and bdellovibrios. Procaryotic inhibitors and their mode of action against phytopathogenic bacteria. Survival and dissemination of phytopathogenic bacteria.

Course Title: GUPP-511P BACTERIOLOGY (Practical)

PRACTICAL

Isolation, purification, identification and host inoculation of phytopathogenic bacteria, staining methods, Biochemical and serological characterization, isolation of plasmid and use of antibacterial chemicals/antibiotics.

SUGGESTED READINGS

- Goto M. 1990. *Fundamentals of Plant Bacteriology*. Academic Press, New York.
- Jayaraman J & Verma JP. 2002. *Fundamentals of Plant Bacteriology*. Kalyani Publ., Ludhiana.
- Mount MS & Lacy GH. 1982. *Phytopathogenic Prokaryotes*. Vols. I, II. Academic Press, New York.
- Verma JP, Varma A & Kumar D. (Eds). 1995. *Detection of Plant Pathogens and their Management*. Angkor Publ., New Delhi.
- Verma JP. 1998. *The Bacteria*. Malhotra Publ. House, New Delhi.



**Course Title: GUPP-512T INTEGRATED DISEASE MANAGEMENT
(Theory) 3(2+1)**

OBJECTIVE

To emphasize the importance and need of IDM in the management of diseases of important crops.

THEORY

Introduction, definition, concept and tools of disease management, components of integrated disease management- their limitations and implications. Development of IDM- basic principles, biological, chemical and cultural disease management. IDM in important crops- rice, wheat, cotton, sugarcane, chickpea, rapeseed mustard, pearl millet, *kharif* pulses, vegetable crops and fruit crops.

**Course Title: GUPP-512P INTEGRATED DISEASE MANAGEMENT
(Practical)**

PRACTICAL

Application of biological, cultural, chemical and biocontrol agents, their compatibility and integration in IDM; demonstration of IDM in certain crops as project work.

SUGGESTED READINGS

- *Gupta VK & Sharma RC. (Eds). 1995. Integrated Disease Management and Plant Health. Scientific Publ., Jodhpur.*
- *Mayee CD, Manoharachary C, Tilak KVBR, Mukadam DS & Deshpande Jayashree (Eds.). 2004.*
- *Biotechnological Approaches for the Integrated Management of Crop Diseases. Daya Publ. House, New Delhi.*
- *Sharma RC & Sharma JN. (Eds). 1995. Integrated Plant Disease Management. Scientific Publ., Jodhpur.*

Course Title: GUPP-513T MUSHROOM PRODUCTION TECHNOLOGY
(Theory) 3(2+1)

OBJECTIVE

To develop mushroom cultivation skills for entrepreneurial activity. Historical development of mushroom cultivation and present status of mushroom industry in India.

THEORY

UNIT I

Historical development of mushroom cultivation and present status, taxonomy, classification, food, medicinal value, uses of mushroom, edible and poisonous mushrooms. Life cycle of cultivated mushrooms, reproduction and strain improvement, maintenance of pure culture, preparation of spawn and facilities required for establishing commercial spawn lab.

UNIT II

Preparation of substrate for mushroom cultivation, long, short and indoor composting methods, formulae for different composts and their computation, qualities and testing of compost, uses of spent mushroom compost/substrate. Facilities for setting up mushroom farm for seasonal and environmentally control cultivation, requirement and maintenance of temperature, relative humidity, CO₂, ventilation in cropping rooms, cultivation technology of *Agaricus bisporus*, *Pleurotus* sp., *Calocybe indica*, *Lentinus edodes* and *Ganoderma lucidum*.

UNIT III

Insect pests, diseases and abnormalities of cultivated mushroom and their management, post harvest processing and value addition, economics of mushroom cultivation, biotechnology and mushroom cultivation.

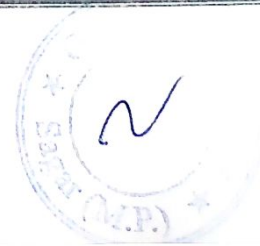
Course Title: GUPP-513P MUSHROOM PRODUCTION TECHNOLOGY
(Practical)

PRACTICAL

Preparation of spawn, compost, spawning, casing, harvesting and postharvest handling of edible mushroom; identification of various pathogens, competitors of various mushroom.

SUGGESTED READINGS

- Frazier, *Food Microbiology*, 1987. McGraw- Hill Education Pvt Ltd
- Pelzer, *Food Microbiology*, 1998 McGraw- Hill Education Pvt Ltd
- Bibek Ray, 2005. *Fundamentals of Food Microbiology*, CRC Press
- Martin and Moss, 2008. *Food Microbiology*, RSC Publishing



Course Title: GUPP-514T DISEASES OF FIELD AND MEDICINAL PLANTS (Theory)

2(1+1)

OBJECTIVE

To educate about the nature, prevalence, etiology, factors affecting disease development and control measures of field and medicinal crop diseases caused by fungal, bacterial and viral diseases.

THEORY

Diseases of Cereal crops- wheat, barley, rice, pearl millet, sorghum and maize. Diseases of Pulse crops- gram, urdbean, mothbean, mungbean, lentil, pigeonpea, soybean. Diseases of Oilseed crops- rapeseed and mustard, sesame, linseed, sunflower, groundnut, castor. Diseases of Cash crops- cotton, sugarcane. Diseases of Fodder legume crops- berseem, oats, guar, lucerne, cowpea. Medicinal crops- plantago, liquorice, mulathi, rosagrass, sacred basil, mentha, ashwagandha, Aloe vera.

Course Title: GUPP-514P DISEASES OF FIELD AND MEDICINAL PLANTS (Practical)
PRACTICAL

Detailed study of symptoms and host parasite relationship of important diseases of above mentioned crops. Collection and dry preservation of diseased specimens of important crops.

SUGGESTED READINGS

- Joshi LM, Singh DV & Srivastava KD. 1984. *Problems and Progress of Wheat Pathology in South Asia*. Malhotra Publ. House, New Delhi.
- Rangaswami G. 1999. *Diseases of Crop Plants in India*. 4th Ed. Prentice Hall of India, N Delhi.
- Ricanel C, Egan BT, Gillaspie Jr AG & Hughes CG. 1989. *Diseases of Sugarcane. Major Diseases*. Academic Press, New York.
- Singh RS. 2007. *Plant Diseases*. 8th Ed. Oxford & IBH, New Delhi.
- Singh US, Mukhopadhyay AN, Kumar J & Chaube HS. 1992. *Plant Diseases of Internatiobnal Importance*. Vol. I.
- *Diseases of Cereals and Pulses*. Prentice Hall, Englewood Cliffs, New Jersey.
- Thind, T.S. 1998. *Diseases of field Crops and their management*. National Agril. Technology Information Centre, Ludhiana, India.



Course Title: GUGPB-512T BIOTECHNOLOGY FOR CROP IMPROVEMENTS (Theory) 3(2+1)

OBJECTIVE

To impart knowledge and practical skills to use biotechnological tools in crop improvement.

THEORY

UNIT I

Biotechnology and its relevance in agriculture; Definitions, terminologies and scope in plant breeding. Tissue culture- History, callus, suspension cultures, cloning; Regeneration; Somatic embryogenesis; Anther culture; somatic hybridization techniques; Meristem, ovary and embryo culture; cryopreservation.

UNIT II

Techniques of DNA isolation, quantification and analysis; Genotyping; Sequencing techniques; Vectors, vector preparation and cloning, Biochemical and Molecular markers: morphological, biochemical and DNA-based markers (RFLP, RAPD, AFLP, SSR, SNPs, ESTs etc.), mapping populations (F₂s, back crosses, RILs, NILs and DH). Molecular mapping and tagging of agronomically important traits. Statistical tools in marker analysis. Robotics; Marker-assisted selection for qualitative and quantitative traits; QTLs analysis in crop plants, Gene pyramiding.

UNIT III

Marker assisted selection and molecular breeding; Genomics and genoinformatics for crop improvement; Integrating functional genomics information on agronomically/economically important traits in plant breeding; Marker-assisted backcross breeding for rapid introgression, Generation of EDVs. Recombinant DNA technology, transgenes, method of transformation, selectable markers and clean transformation techniques, vector-mediated gene transfer, physical methods of gene transfer. Production of transgenic plants in various field crops: cotton, wheat, maize, rice, soybean, oilseeds, sugarcane etc. Commercial releases.



UNIT IV

Biotechnology applications in male sterility/hybrid breeding, molecular farming. MOs and related issues (risk and regulations); GMO; International regulations, biosafety issues of GMOs; Regulatory procedures in major countries including India, ethical, legal and social issues; Intellectual property rights, Bioinformatics & Bioinformatics tools. Nanotechnology and its applications in crop improvement programmes.

Course Title: GUGPB-512P BIOTECHNOLOGY FOR CROP IMPROVEMENTS (Practical) PRACTICAL

Requirements for plant tissue culture laboratory-Techniques in plant tissue culture - Media components and media preparation -Aseptic manipulation of various explants; observations on the contaminants occurring in media – interpretations - Inoculation of explants: Callus induction and plant regeneration - Plant regeneration; Standardizing the protocols for regeneration; Hardening of regenerated plants; Establishing a greenhouse and hardening procedures - Visit to commercial micropropagation unit. Transformation using *Agrobacterium* strains, GUS assay in transformed cells / tissues. DNA isolation. DNA purity and quantification tests, gel electrophoresis of proteins and isozymes, PCR-based DNA markers, gel scoring and data analysis for tagging and phylogenetic relationship. construction of genetic linkage maps using computer software.

SUGGESTED READINGS

- Chopra V. L, & Nasim A. 1990. *Genetic Engineering and Biotechnology: Concepts, Methods and Applications*. Oxford & IBH.
- Gupta P. K. 1997. *Elements of Biotechnology*. Rastogi Publ.
- Hackett P. B., Fuchs J. A. & Messing J. W. 1988. *An Introduction to Recombinant DNA Technology - Basic Experiments in Gene Manipulation*. 2nd Ed. Benjamin Publ. Co.
- Sambrook J & Russel D. 2001. *Molecular Cloning - a Laboratory Manual*. 3rd Ed. Cold Spring Harbor Lab. Press.
- Singh B. D. 2005. *Biotechnology, Expanding Horizons*. Kalyani.



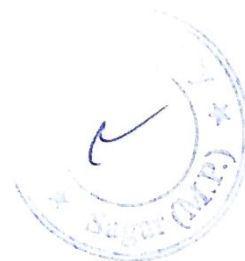
**Course Title: GUGPB-513P MAINTENANCE BREEDING AND
CONCEPT OF VARIETY RELEASE AND PRODUCTION (Practical)**

PRACTICAL

Identification of suitable areas/locations for seed production; Ear-to-row method and nucleus seed production - Main characteristics of released and notified varieties, hybrids and parental lines; Identification of important weeds/objectionable weeds; Determination of isolation distance and planting ratios in different crops; Seed production techniques of varieties in different crops; Hybrid seed production technology of important crops.

SUGGESTED READINGS

- *Agarwal R. L. 1997. Seed Technology. 2nd Ed. Oxford & IBH.*
- *Chhabra A. K. 2006. Practical Manual of Floral Biology of Crop Plants.*
- *Department of Plant Breeding. CCS HAU Hisar.*
- *Kelly A. F. 1988. Seed Production of Agricultural Crops. Longman.*
- *McDonald M. B. Jr & Copeland LO. 1997. Seed Production: Principles and Practices. Chapman & Hall.*
- *Musil A. F. 1967. Identification of Crop and Weed Seeds. Handbook No. 219, USDA, Washington, DC.*
- *Poehlman J. M. & Borthakur D. 1969. Breeding Asian Field Crops. Oxford & IBH.*
- *Singh B. D. 2005. Plant Breeding: Principles and Methods. Kalyani.*
- *Thompson J. R. 1979. An Introduction to Seed Technology. Leonard Hill.*
- *Tunwar N. S. & Singh S. V. 1985. Handbook of Cultivars. ICAR.*



**Course Title: GUGPB-513T MAINTENANCE BREEDING AND
CONCEPT OF VARIETY RELEASE AND PRODUCTION (Theory)**
2(1+1)

OBJECTIVE

To apprise the students about the variety deterioration and steps to maintain the purity of varieties & hybrids and principles of seed production in self & cross pollinated crops.

THEORY

UNIT I

Variety Development and Maintenance: Definition- variety, cultivar, extant variety, essentially derived variety, independently derived variety, reference variety, farmers' variety, hybrid and population; Variety testing, release and notification systems in India and abroad. DUS testing- DUS Descriptors for major crops; Genetic purity concept and maintenance breeding. Factors responsible for genetic deterioration of varieties - safeguards during seed production; Maintenance of varieties in self and cross-pollination crops- isolation distance; Principles of seed production; Methods of nucleus and breeder seed production.

UNIT II

Generation system of seed multiplication -nucleus, breeders, foundation, certified, - Quality seed production technology of self and cross-pollinated crop varieties viz. cereals & millets (wheat, barley, paddy, pearl millet, sorghum, maize and ragi etc.); Pulses (greengram, blackgram, cowpea, pigeonpea, chickpea, fieldpea, lentil); Oilseeds (groundnut, soybean, sesame, castor, sunflower, safflower, linseed, rapeseed and mustard); fibres (cotton, jute) and forages (guar, forage sorghum, teosinte, oats, berseem, lucerne); Seed certification procedures; Seed laws and plant variety protection regulations in India and international systems.



OBJECTIVE

This course is meant for students of agricultural and animal sciences other than Statistics. Designing an experiment is an integrated component of research in almost all sciences. The students would be exposed to concepts of Design of Experiments so as to enable them to understand the concepts involved in planning, designing their experiments and analysis of experimental data.

THEORY

UNIT I

Need for designing of experiments, characteristics of a good design. Basic principles of designs-randomization, replication and local control. Uniformity trials, size and shape of plots and blocks; Analysis of variance; Completely randomized design, randomized block design and Latin square design.

UNIT II

Factorial experiments, (symmetrical as well as asymmetrical). orthogonality and partitioning of degrees of freedom, Confounding in symmetrical factorial experiments, Factorial experiments with control treatment.

UNIT III

Split plot and strip plot designs; Analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, crossover designs, balanced incomplete block design, resolvable designs and their applications ~ Lattice design, alpha design-concepts, randomisation procedure, analysis and interpretation of results. Response surfaces. Experiments with mixtures.

UNIT IV

Bioassays- direct and indirect, indirect assays based on quantal dose response, parallel line and slope ratio assays potency estimation.



Course Title: GUSTAT-511P DESIGN OF EXPERIMENTS (Practical)

PRACTICAL

- ❖ Uniformity trial data analysis, formation of plots and blocks.
- ❖ Fairfield Smith Law; Analysis of data obtained from CRD, RBD, LSD
- ❖ Analysis of factorial experiments without and with confounding; Analysis with missing data; Split plot and strip plot designs
- ❖ Transformation of data; Analysis of resolvable designs
- ❖ Fitting of response surfaces.

SUGGESTED READINGS

- Cochran WG & Cox GM. 1957. Experimental Designs. 2nd Ed. John Wiley.
- Dean AM & Voss D. 1999. Design and Analysis of Experiments. Springer.
- Federer WT. 1985. Experimental Designs. MacMillan. Fisher RA. 1953.
- Design and Analysis of Experiments. Oliver & Boyd.
- Nigam AK & Gupta VK. 1979. Handbook on Analysis of Agricultural Experiments. IASRI Publ. Pearce SC. 1983.
- The Agricultural Field Experiment: A Statistical Examination of Theory and Practice. John Wiley. Design Resources Server: www.iasri.res.in/design.



**Course Title: GUPGS-511 LIBRARY AND INFORMATION SERVICES
(Theory)**

N.C.

OBJECTIVE

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

PRACTICAL

- ❖ Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.).
- ❖ Tracing information from reference sources.
- ❖ Literature survey; Citation techniques / Preparation of bibliography.
- ❖ Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services.
- ❖ Use of Internet including search engines and its resources; ere sources access methods.



**Course Title: GUPGS-512 INTELLECTUAL PROPERTY AND ITS
MANAGEMENT IN AGRICULTURE**

N.C.

OBJECTIVE

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge based economy.

THEORY

UNIT I

Historical perspectives and need for the introduction of Intellectual Property Right regime: TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs. Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, Trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and biodiversity protection

UNIT II

Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives, Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.

SUGGESTED READINGS

- *Erbisch FH & Maredia K. 1998. Intellectual Property Rights in Agricultural Biotechnology. CABI.*
- *Ganguli P. 2001. Intellectual Property Rights: Unleashing Knowledge Economy. McGraw-Hill.*
- *Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC & Aesthetic Technologies. Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol. V.*
- *Technology Generation and IPR Issues. Academic Foundation. Rothschild M & Scott N. (Ed.). 2003.*
- *Intellectual Property Rights in Animal Breeding and Genetics. CABI.*
- *Saha R. (Ed.). 2006. Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies. Daya Publ. House.*
- *The Indian Acts - Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and amendments; Layout Design Act, 2000; PPV and FR Act 2001, and Rules 2003; National Biological Diversity Act, 2003.*