

1. Name of the Department: Department of Plant Pathology, College of Agriculture Dapoli.

2. Brief Historical background : Teaching of the courses in the subject of Plant Pathology began when College of Agriculture was established at Dapoli in the year 1965. Post graduate education in the subject commenced from 1981-1982 with an intake capacity of 2 seats for M.Sc. degree programme. In the subsequent academic year 1982-1983, the total intake capacity was increased and 6 seats were allotted for this degree programme. At present the same pattern is being followed. The doctoral programme commenced from the year 2001-2002 with an intake capacity of 2 seats.

3. Academic programmes:

a) Doctoral Programme:

Semester No	Term No	Course No	Credits	Title of the course offered by the department
I	I	PL.PATH-601	2+1=3	Advanced Mycology
I	I	PL.PATH-602	2+1=3	Advanced Virology
I	I	PL.PATH-603	2+1=3	Advanced Bacteriology
II	II	PL.PATH-518	2+1=3	Epidemiology and Forecasting of Plant Diseases
II	II	PL.PATH-604	2+1=3	Molecular Basis of Host Pathogen Interaction
III	III	PL.PATH-605	1+0=1	Principles and Procedures of Certification
III	III	PL.PATH-606	2+0=2	Plant Bio-security and Bio-safety
III	III	PL.PATH-691	1+0=1	Doctoral Seminar-I
IV	IV	PL.PATH-692	1+0=1	Doctoral Seminar-II

Course curricula and Syllabi :

PL.PATH-601, Advanced Mycology: General introduction, historical development and advances in mycology. Recent, taxonomic criteria and morphological criteria for classification. Serological, chemical (chemotaxonomy), molecular and numerical (computer based assessment) taxonomy. Interaction between groups, phylogeny, micro-condition, conidiogenesis and sporulating structures of fungi imperfectii. Morphology and reproduction of representative plant pathogenic genera from different groups of fungi. Sexual reproduction in different groups of fungi. Population biology, pathogenic variability/ vegetative compatibility. Heterokaryosis and para-sexual cycle. Sex hormones in fungi. Pleomorphism and speciation in fungi. Mechanism of extra –nuclear inheritance in fungi. Bio-degradation.

PL.PATH-602, Advanced Virology: mechanism of virus transmission by vectors. Virus-vector relationship. Bimodal transmission and taxonomy of viruses and vectors, vector specificity for classes of viruses, virus replication, assembly and architecture, ultra

structural changes due to virus infection, variation, mutation and virus strains. Immunoglobulin structure and functions of various domains. Methods of immunodiagnosis, hybridoma technology and use of monoclonal antibodies in identification of viruses and their strains. Polymerase chain reaction. Genome organization, replication, transcription and translational strategies of para- reoviruses and Gemini viruses. Satellite viruses and Satellite RNA genome organization in tomo, poty, bromo, cucumo and tospo viruses. Gene expression and regulation, viral promoters, molecular mechanism of host virus interaction, virus induced genes, molecular mechanism of vector transmission, symptom expression, viroids and prions. Genetic engineering with plant viruses, viral suppressors, a RNAi dynamics. Resistant genes, viruses potential as vectors, genetically engineered resistance, transgenic plants. Techniques and application of tissue culture, origin, evolution and inter-relationship and animal viruses.

PL.PATH-603, Advanced Bacteriology: Current approaches for the characterization and identification of phyto-pathogenic bacteria. Ultra structures and biology of bacteria. Current trends in taxonomy of phyto-pathogenic prokarya. Role of enzymes, toxins, extra cellular polysaccharides, polypeptide signals in disease development. Mechanism of wilt (*Ralstonia solanacearum*) development, mechanism of soft rot (*Erwinia* spp.) development, mechanism of crown gall formation. Host Bacteria interaction. Quorum sensing phenomena, type III secretion system, HR/ SR reactions, R genes, avR gene, hrp genes, effector protein. Molecular variability among phyto-pathogenic prokarya and possible host defense mechanism/s. genetic engineering for management of bacterial plant pathogens. Gene silencing. RNAi technology. Epidemiology in relation to bacterial plant pathogens. Development of diagnostic kit. Beneficial prokaryotes, endophytes, PGPR, phytoplane bacteria and their role in disease management. Endo- symbionts for host defense.

PL.PATH-518, Epidemiology and Forecasting of Plant Diseases: Epidemic concept and historical development, pathometry and crop growth stages, epidemic growth analysis. Common and natural logarithms, function fitting area under disease progress curve and correction factors, inoculum dynamics, population biology of pathogens, temporal spatial variability in plant pathogens. Survey, surveillance and vigilance, crop loss assessment and models. Principles and pre-requisites of forecasting, systems and factors affecting various components of forecasting, some early forecasting, procedures based on weather and inoculum potential, modeling disease growth and disease prediction.

PL.PATH-604, Molecular Basis of Host Pathogen Interaction: Importance and role of biotechnological tools in plant pathology-Basic concepts and principles to study host pathogen-relationship. Molecular basis of host-pathogenesis interaction-fungi, bacteria and viruses: recognition system, single transduction. Induction of defense responses-pathogenesis related proteins, HR, reactive oxygen species, phytoalexins and systemic acquired resistance, programmed cell death, viral induced gene silencing. Molecular basis

of gene-for-gene hypothesis; R-gene expression and transcription profiling, mapping and cloning of resistance genes and marker-aided selection, pyramiding of R genes. Biotechnology and disease management; development of disease resistant plants using genetic engineering approaches, different methods of gene transfer. biosafety issues related to GM crops.

PL.PATH-605, Principles and Procedures of Certification: Introduction to certification. International scenario of certification and role of ISTA, EPPO, OECD etc, in certification and quality control. Case studies of certification systems of USA and Europe, National Regulatory mechanism and certification system including seed certification, minimum seed certification standards. National status of seed health in seed certification methods for testing genetic identity, physical purity, germination percentage, seed health etc. Fixing tolerance limits for disease and insect pests in certification and quality control programmes. Methods used in certification of seeds, vegetative propagules and *in vitro* cultures. Accreditation of seed testing laboratories. Role of seed/planting material health certification in national and international trade.

PL.PATH-606, Plant Bio-security and Bio-safety: History of Bio-security, concept of bio-security, components of bio-security, quarantine, invasive alien species, bio-warfare, emerging/resurgence of pest and diseases. National Regulatory Mechanism and International Agreements/Conventions viz. Agreement on application of sanitary and phyto-sanitary (SPS) measures/World Trade Organization (WTO), Convention on Biological Diversity (CBD), international standards for phyto-sanitary measures, pest risk analysis, risk assessment models, pest information system, early warning and forecasting system, use of Global Positioning System (GPS) and Geographic Information System (GIS) for plant bio-security, pest/disease and epidemic management, strategies for combating risks and costs associated with agro-tourism event, mitigation planning, integrated approach for bio-security. Bio-safety policies and regulatory mechanism, Cartagena protocol on bio-safety and its implications, issues related to release of genetically modified crops.

b) M.Sc. Programme:

Semester No	Term No	Course No	Credits	Title of the course offered by the department
I	I	PL.PATH-501	2+1=3	Mycology
I	I	PL.PATH-502	2+1=3	Plant Virology
I	I	PL.PATH-503	2+1=3	Plant Bacteriology
II	II	PL.PATH-504	3+0=3	Principles of Plant Pathology
II	II	PL.PATH-506	2+1=3	Principles of Plant Disease Management
II	II	PL.PATH-510	2+1=3	Seed Health Technology
III	I	PL.PATH-505	0+2=2	Detection and Diagnosis of plant diseases
IV	II	PL.PATH-	1+0=1	Seminar

Course curricula and Syllabi:

PL PATH 501 : Mycology

Introduction, definition of different terms, basic concepts. Importance of mycology in agriculture, relation of fungi to human affairs, history of mycology. Concepts of nomenclature and classification, fungal biodiversity, reproduction in fungi. The comparative morphology, ultrastructure, characters of different groups of fungi up to generic level: (a) Myxomycota and (b) Eumycota- i) Mastigomycotina ii) Zygomycotina, iii) Ascomycotina, iv) Basidiomycotina v) Deuteromycotina. Lichens types and importance, fungal genetics and variability in fungi.

PL PATH 502 : Plant Virology

History of plant viruses, composition and structure of viruses. Symptomatology of important plant viral diseases, transmission, chemical and physical properties, host virus interaction, virus vector relationship. Virus nomenclature and classification, genome organization replication and movement of viruses. Isolation and purification, electron microscopy, protein and nucleic acid based diagnostics. Mycoviruses, phytoplasma arbo and baculoviruses satellite viruses. Satellite RNAs, phages, viroids, prions. Principles of the working of electron- microscope and ultra-microtome. Origin and evolution, mechanism of resistance, genetic engineering ecology, and management of plant viruses.

PL. PATH 503: Plant Bacteriology

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. 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.

PL. PATH 504 : Principles of Plant Pathology

Importance, definitions and concepts of plant diseases , history and growth of plant pathology , biotic and abiotic causes of plant diseases. Growth , reproduction survival and dispersal of important plant pathogens , role of environment and host nutrition on disease development . Host parasite interaction, recognition concept and infection, symptomatology , disease development – role of enzymes toxins growth regulators ; defense strategies –oxidative burst ; Phenolics, Phytoalexins , PR proteins , Elicitors . Altered plant metabolism as affected by plant pathogens . Genetics of resistance; ‘R’ genes; mechanism of genetic variations in pathogens; molecular basis for resistance ; marker-assisted selection; genetic engineering for disease resistance. Disease management strategies.

PL PATH 505: Detection and Diagnosis of Plant Diseases

Practical: Method to prove Koch's postulates with biotroph and necrotroph pathogens, pure culture techniques, use of selective media to isolate pathogens. Preservation of plant pathogens and disease specimens, use of haemocytometer, micrometer, centrifuge , pH meter, camera lucida . Microscopic techniques and staining methods phase contrast system, chromatography , use of electron microscope, spectrophotometer, ultracentrifuge and electrophoretic apparatus, disease diagnostics, serological and molecular techniques for detection of plant pathogens. Evaluation of fungicides , bactericides etc: field experiments , data collection and preparation of references.

PL PATH 506: Principles of Plant Disease Management

Principles of plant diseases management by cultural , physical , biological, chemical, organic amendments and botanicals methods of plant disease control , integrated control measures of plant diseases. Disease resistance and molecular approach for disease management. Foliage, seed and soil applications of chemicals , role of stickers , spreaders and other adjuvants , health vis-a – vis environmental hazards , residual effects and safety measures. History of fungicides , bactericides antibiotics, concepts of pathogens , immobilization chemical protection and chemotherapy, nature properties and mode of action of antifungal, antibacterial and antiviral chemicals.

PL PATH 506: Seed Health Technology

History and economic importance of seed pathology in seed industry , plant quarantine and SPS under WTO. Morphology and anatomy of typical monocotyledonous and dicotyledonous infected seeds. Recent advances in the establishment and subsequent cause of disease development in seed and seedling. Localization and mechanism of seed transmission in relation to seed infection , seed to plant transmission of pathogens. Seed certification and tolerance limits , types of losses caused by seed- borne diseases in true and vegetatively propagated seeds, evolutionary adaptations of crop plants to defend seed invasion by seed- borne pathogens. Epidemiological factors influencing the transmission of seed – borne diseases, forecasting of epidemics through seed –borne infection.

4. Infrastructure

a) Laboratories : 3

Under graduate laboratory – 1

Post graduate laboratory - 1

Post entry quarantine – 1

b) Name of important instruments/facilities:

Sr. No	Name of instruments
1.	ELISA reader
2.	PCR assembly
3.	Gel Electrophoresis unit
4.	High speed centrifuge
5.	UV VIS Spectrophotometer
6.	Lyophilizer
7.	Trinocular microscope with microphotography attachment
8.	Freeze dryer
9.	Cooling centrifuge
10.	BOD incubators
11.	Laminar air flow benches
12.	autoclaves
13.	Distillation unit
14.	Microscope eyepiece digital camera

c) Information pertaining to this point will be provided shortly.

d) Information pertaining to this point will be provided shortly.

5. Faculty:

a) Academic Staff: Assistant Professor and above with the details of staff as given below

Recent photograph	Name of the faculty	Dr. V. S. Pande
	Post Held	Associate Professor and Head
	Date of Birth	11/09/1955
	Qualification	Ph.D.
	Area of Specialization	Plant Pathology and Biological control
	Experience (Yrs.)	32 years
	Research Projects guided	
	Ph.D.	-
	M.Sc.	-
	Present area of research	
	Contact details	
	Mobile	9423377946
	Name of the faculty	Dr. Pushpa Patil
	Post Held	Plant Pathologist, NARP Regional Fruit Research Station, Vengurla
	Date of Birth	
	Qualification	Ph.D.
	Area of Specialization	Plant Virology
	Experience (Yrs.)	
	Research Projects guided	
	Ph.D.	-
	M.Sc.	-
	Present area of research	
	Contact details	
	Mobile	
	Name of the faculty	Dr. M. B. Dalvi
	Post Held	Junior Plant Pathologist AICRP on Mango, RFRS, Vengurla
	Date of Birth	
	Qualification	Ph.D.
	Area of Specialization	Mango pathology
	Experience (Yrs.)	23
	Research Projects guided	
	Ph.D.	-
	M.Sc.	-
	Present area of research	Mango pathology
	Contact details	
	Mobile	9423301231

Recent photograph	Name of the faculty	Dr. M. S. Joshi	
	Post Held	Jr. Plant Pathologist	
	Date of Birth	24/12/1963	
	Qualification	Ph.D.	
	Area of Specialization	Mycology and Plant Pathology	
	Experience (Yrs.)	22	
	Research Projects guided		
	Ph.D.	Presently guiding 4 students	
	M.Sc.	8	
	Present area of research	Rice Pathology	
	Contact details		
	Mobile	9420639320	
		Name of the faculty	Dr. P. G. Borkar
		Post Held	Assistant Professor
Date of Birth		09/11/1960	
Qualification		Ph.D.	
Area of Specialization		Mycology and Plant Pathology	
Experience (Yrs.)		23	
Research Projects guided			
Ph.D.		Presently guiding 1 students	
M.Sc.		5	
Present area of research			
Contact details			
Mobile		9922023693	
		Name of the faculty	Prof. J. J. Kadam
	Post Held	Assistant Professor	
	Date of Birth		
	Qualification	M.Sc.	
	Area of Specialization	Mycology and Plant Pathology	
	Experience (Yrs.)	9	
	Research Projects guided		
	Ph.D.	-	
	M.Sc.	3	
	Present area of research		
	Contact details		
	Mobile	9423378008	

Recent photograph	Name of the faculty	Prof. U.A.Gadre
	Post Held	Jr. Plant Pathologist AICRPSpices
	Date of Birth	1953
	Qualification	M.Sc.
	Area of Specialization	Plant Pathology
	Experience (Yrs.)	36
	Research Projects guided	
	Ph.D.	-
	M.Sc.	14
	Present area of research	Diseases of spices and aromatic plants.
	Contact details	
	Mobile	9422431263
	Name of the faculty	Prof. R. J. Bhagwat
	Post Held	Jr. Plant Pathologist
	Date of Birth	1965
	Qualification	
	Area of Specialization	Plant Pathology
	Experience (Yrs.)	18
	Research Projects guided	
	Ph.D.	-
	M.Sc.	-
	Present area of research	
	Contact details	
	Mobile	
	Name of the faculty	Prof. N. R. Padalkar
	Post Held	Jr.Plant Pathologist
	Date of Birth	
	Qualification	M.Sc.
	Area of Specialization	Plant Pathology
	Experience (Yrs.)	28
	Research Projects guided	
	Ph.D.	-
	M.Sc.	1
	Present area of research	
	Contact details	
	Mobile	9420909302

b) Research Staff: SRA and JRA

Recent photograph	Name of the faculty	Shri. C. B. Gondhalekar
	Post Held	Senior Research Assistant
	Date of Birth	23/03/1965
	Qualification	M.Sc.
	Area of Specialization	Plant Pathology
	Experience (Yrs.)	17
	Research Projects guided	
	Ph.D.	-
	M.Sc.	-
	Present area of research	
	Contact details	
	Mobile	9422631227
	Name of the faculty	Shri. S. B. Mane
	Post Held	Senior Research Assistant
	Date of Birth	
	Qualification	M.Sc.
	Area of Specialization	Plant Pathology
	Experience (Yrs.)	18
	Research Projects guided	
	Ph.D.	-
	M.Sc.	-
	Present area of research	
	Contact details	
	Mobile	

Information pertaining to remaining points is being compiled and will be communicated shortly.