

# Programa Analítico de Disciplina

## FIP 680 - Biologia de Populações de Fitopatógenos

Departamento de Fitopatologia - Centro de Ciências Agrárias

Catálogo: 2025

Número de créditos: 5

Carga horária semestral: 75h

Carga horária semanal teórica: 3h

Carga horária semanal prática: 2h

Semestres: I

### Ementa

Conceitos  
Selector  
Mutacao  
Migracao ou fluxo genico  
Deriva genetica  
Recombinacao  
Ferramentas e recursos em biologia de populacoes

### Conteúdo

Unidade	T	P	To
<b>1. Conceitos</b> 1. Conceitos e terminologia 2. Evolucao 3. Mecanismos evolutivos 4. Conceitos de genetica de populacoes	9h	0h	9h
<b>2. Selector</b> 1. Selecao 2. Fitness 3. Modelos	6h	0h	6h
<b>3. Mutacao</b> 1. Mutacao 2. Equilibrio mutacao - deriva 3. Mutacao em populações de fitopatogenos	6h	0h	6h
<b>4. Migracao ou fluxo genico</b> 1. Estrutura populacional 2. Modelos 3. Equilibrio migracao - deriva 4. Migracao e populações de fitopatogenos	6h	0h	6h
<b>5. Deriva genetica</b> 1. Deriva 2. Amostragem, efeito do fundador, gargalo 3. Modelo Wright-Fisher	6h	0h	6h

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4. Endogamia			
<b>6. Recombinação</b> 1. Recombinação 2. Populações panmíticas, clonais e epidêmicas 3. Equilíbrio de Hardy-Weinberg 4. Desequilíbrio de ligação	6h	0h	6h
<b>7. Ferramentas e recursos em biologia de populações</b> 1. Análise de sistemas 2. Métodos quantitativos 3. Ferramentas analíticas	6h	0h	6h
<b>8. História da biologia de populações</b> 1. Nomes e fatos 2. Similaridades, ambiguidades e diferenças	0h	2h	2h
<b>9. Marcadores moleculares</b> 1. Isozymas; RAPD; RFLP, AFLP e similares 2. Microsatélites 3. SNPs e genomas completos	0h	2h	2h
<b>10. Seleção</b> 1. Estimativa de fitness 2. Seleção: estudos de caso.	0h	4h	4h
<b>11. Mutação</b> 1. Estimativas 2. Mutação: Estudos de caso	0h	4h	4h
<b>12. Migração</b> 1. Estimativas 2. Migração: Estudos de caso	0h	4h	4h
<b>13. Deriva genética</b> 1. Inferindo deriva genética 2. Deriva genética: Estudos de caso	0h	4h	4h
<b>14. Recombinação</b> 1. Estimativas 2. Recombinação: Estudos de caso	0h	4h	4h
<b>15. Contribuições para o manejo de doenças</b> 1. Epidemiologia molecular 2. Resistência a drogas 3. Uso estratégico de genes de resistência	0h	6h	6h
<b>Total</b>	<b>45h</b>	<b>30h</b>	<b>75h</b>

Teórica (T); Prática (P); Total (To);

## FIP 680 - Biologia de Populações de Fitopatógenos

### Bibliografias básicas

Descrição	Exemplares
Grünwald, N. J. & Goss, E. Evolution and population genetics of exotic and re-emerging pathogens: novel tools and approaches. Annual Review of Phytopathology 49:249-267. 2011.	0
Hartl, D. L. & Clark, A. G. Principles of population genetics. 4th Sinauer Associated, Inc, Sunderland. 2007.	0
Jobling, M., Hollox, E., Hurles, M., Kivisild, T. & Tyler-Smith, C. Human evolutionary genetics 2nd Ed. 650 pp. New York, Garland Science. 2013.	0
Li, L. M., Grassly, N. C., and Fraser, C. Genomic analysis of emerging pathogens: methods, application and future trends. Genome Biology 15:541 <a href="http://genomebiology.com/2014/15/11/541">http://genomebiology.com/2014/15/11/541</a> 2014.	0
Meeûs, T. D., McCoy, K. D., Prugnolle, F., Chevillon, C., Durand, P., Hurtrez-Boussès, S. & Renaud, F. Population genetics and molecular epidemiology or how to "débusquer la bête", Inf. Genetics Evol. 7:308-332. 2007.	0
Milgroom, M. G. Population Biology of Plant Pathogens: Genetics, Ecology, and Evolution. APS Press, 2015.	0
Mundt, C. C. Durable resistance: A key to sustainable management of pathogens and pests. Infection, Genetics and Evolution 27:446-455. 2014.	0
Nei, M. & Kumar, S. Molecular evolution and phylogenetics. Oxford University Press, New York. 2000.	0
Stefansson, T. S., McDonald, B. A., & Willi, Y. The influence of genetic drift and selection on quantitative traits in a plant pathogenic fungus. PLoS One. 9:e112523 <a href="http://dx.doi.org/10.1371/journal.pone.0112523">dx.doi.org/10.1371/journal.pone.0112523</a> . 2014.	0
Stuckenbrock, E. H. & Bataillon, T. A. Population genomics perspective on the emergence and adaptation of new plant pathogens in agro-ecosystems. PloS Pathogens 8: e1002893. <a href="http://doi:10.1371/journal.ppat.1002893">doi:10.1371/journal.ppat.1002893</a> . 2013.	0
Waples, R. S. & Gaggiotti, O. What is a population? An empirical evaluation of some genetic methods for identifying the number of gene pools and their degree of connectivity. Mol. Ecol 15:1419-1439. 2006.	0

### Bibliografias complementares

*Não definidas*

# Syllabus

## FIP 680 - Population Biology of Plant Pathogens

Departamento de Fitopatologia - Centro de Ciências Agrárias

Catalog: 2025

Number of credits: 5  
Total hours: 75h  
Weekly workload - Theoretical: 3h  
Weekly workload - Practical: 2h

Period: I

### Content

Concepts of population biology  
Selection and variability in populations  
Mutation and variability in populations  
Migration and variability in populations  
Genetic drift and variability in population  
Recombination and variability in populations  
Useful tools and resources to study population biology

### Course program

Unit	T	P	To
<b>1. Concepts of population biology</b> 1. Concepts and terminology 2. Evolution 3. Evolutionary mechanisms 4. Basic concepts of population genetics.	9h	0h	9h
<b>2. Selection and variability in populations</b> 1. Natural selection 2. Fitness 3. Selection models	6h	0h	6h
<b>3. Mutation and variability in populations</b> 1. Mutation types and models 2. Mutation - drift equilibrium 3. Effects of mutation pathogen populations	6h	0h	6h
<b>4. Migration and variability in populations</b> 1. Population structure 2. Migration models 3. Migration - drift equilibrium 4. Gene flow and plant pathogen populations	6h	0h	6h
<b>5. Genetic drift and variability in population</b> 1. Concepts and definitions 2. Sampling, founder and bottleneck effects 3. The Wright-Fisher model	6h	0h	6h

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4. Inbreeding			
<b>6. Recombination and variability in populations</b> 1. Concepts and definitions 2. Sexual and asexual populations 3. Hardy-Weinberg equilibrium 4. Linkage disequilibrium	6h	0h	6h
<b>7. Useful tools and resources to study population biology</b> 1. Systems analysis 2. Quantitative methods in population biology 3. Analytical tools	6h	0h	6h
<b>8. The timeline of population biology of plant pathogens</b> 1. Names and facts: a retrospective of important contributions 2. Conceptual similarities, differences and ambiguities in the fields of evolutionary biology and plant pathology	0h	2h	2h
<b>9. Molecular markers used in population genetics studies</b> 1. Isozymes; RAPD; RFLP, AFLP and alike 2. Microsatellites 3. SNPs and whole genome data	0h	2h	2h
<b>10. Selection and population variability</b> 1. Estimates of fitness 2. Selection in populations of plant pathogens: case studies	0h	4h	4h
<b>11. Mutation and population variability</b> 1. Estimates of mutation 2. Mutation in populations of plant pathogens: case studies	0h	4h	4h
<b>12. Migration and population variability</b> 1. Estimates of migration 2. Migration in populations of plant pathogens: case studies	0h	4h	4h
<b>13. Genetic drift and population variability</b> 1. Inferring genetic drift 2. Genetic drift in populations of plant pathogens: case studies	0h	4h	4h
<b>14. Recombination and population variability</b> 1. Estimates of recombination 2. Recombination in populations of plant pathogens: case studie	0h	4h	4h
<b>15. Contributions of population biology to plant disease management</b> 1. Molecular epidemiology of plant diseases 2. Drug resistance 3. Deployment of resistance genes	0h	6h	6h
<b>Total</b>	<b>45h</b>	<b>30h</b>	<b>75h</b>

Theoretical (T); Practical (P); Total (To);

## FIP 680 - Population Biology of Plant Pathogens

Fundamental references	
Description	Copies
Grünwald, N. J. & Goss, E. Evolution and population genetics of exotic and re-emerging pathogens: novel tools and approaches. Annual Review of Phytopathology 49:249-267. 2011.	0
Hartl, D. L. & Clark, A. G. Principles of population genetics. 4th Sinauer Associated, Inc, Sunderland. 2007.	0
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Meeûs, T. D., McCoy, K. D., Prugnolle, F., Chevillon, C., Durand, P., Hurtrez-Boussès, S. & Renaud, F. Population genetics and molecular epidemiology or how to "débusquer la bête", Inf. Genetics Evol. 7:308-332. 2007.	0
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Complementary references	
<i>Not defined</i>	