ENTO 610-Host Plant Resistance

SYLLABUS

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Course hours **TTH (8:00-9:15) 3 credits**
Course place: **Rm. 205 Heep Center, West Campus**

Course Description: Each instructor will present a series of lectures designed to acquaint you with fundamentals of plant breeding and practical and theoretical considerations in obtaining lines resistant to pathogens and arthropods. The order is typically 1) plant breeding by Dr. Smith; 2) HPR in plant pathology by Dr. Starr and 3) HPR in entomology by Dr. Medina. The course will require for students to form teams and prepare a team paper together.

Team papers: This exercise is designed to give you the opportunity to participate in an interdisciplinary endeavor and is meant to emulate some of the practical aspects of interdisciplinary activity. Class members will be asked to form into teams, or they will be assigned to one after the first few weeks of class. Each team will ideally consist of at least 1 member from agronomy, plant pathology and entomology, respectively. The team assignment will be to develop an HPR paper in the format of a grant proposal application. The procedure will be as follows: Each team will decide on a crop-pathogen-arthropod system & each members role; **submit the information by Feb. 14 for instructor approval.** Upon approval, the team will prepare the paper in the following format:

Justification: To be written jointly outlining the importance of the work.

Procedures: To be written individually outlining the pertinent contributions of each team member, i.e., the plant breeder will outline how and where to obtain germplasm, how to develop and maintain the lines etc., entomologist outlines how to select lines for HPR to arthropods, etc.
NOTE - Although these sections are to be written individually, factors such as germplasm available, how much the pathologist/entomologist can evaluate, how much the breeder can maintain after screening, who screens for what plant characters when, etc., influence how each individual section is written. These factors must be worked out in team discussions.

Plan of Work: This section will be written jointly and show a flow chart indicating the chronology of events anticipated from start to finish of the project.

Budget: This section will be written individually but so that the parts can be consolidated into a single section. Only direct costs for labor, supplies, travel, publications, etc. need be listed.

References: This section will be written individually with each team member including the references that they contributed in their own bibliography, alphabetic by Author(s) and Year.

NOTE - The way in which citations are used in the text and cited in the reference section are to be determined by each team, but must be consistent within a paper.

Other Sections: These may be added at the discretion of the team if necessary. However, the entire paper may not exceed 20 pages in length excluding pages for budgets and references.

Grading:

3 exams given during the course	=	40%
Comprehensive final exam	=	40%
Team paper	=	15%
Discussion, preparation, and course participation	=	5%

NOTE - Grades may be curved if the instructors deem it appropriate, in which case all grades will be adjusted up or down the same amount and A, B, C, D, and F grades will be assigned on a 90-100, 80-90, etc. basis, respectively.

Learning Outcomes Expected: Students should:

1) Learn the terms, concepts and methods for breeding for host plant resistance
2) Apply this knowledge to design and conduct a program in their disciplinary area; and
3) Participate in a research team to write a competitive grant that demonstrates the team's ability to design and conduct work in the area.

Attendance: Since our lectures are based on several sources, in order to succeed in this class it is strongly recommended you attend all lectures and discussions.

Lecture Exams: Exam dates will be discussed in class. Please note there is no exam during finals week.

Americans with Disabilities Act (ADA) Policy Statement: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe that you have a disability requiring accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Cain Hall or call 845-1637.

Laboratory Safety: Texas A&M is committed to the safety of all students and employees participating in teaching laboratories. To ensure that a safe environment is maintained in our teaching laboratories, it is expected that all students will adhere to general safety guidelines and emergency procedures, as well as course-specific and activity-specific safety instructions provided by faculty and teaching assistants. Laboratory safety and emergency procedures will be reviewed during the first class period and on a regular basis thereafter.

Academic Integrity Statements: AGGIE HONOR CODE

"An Aggie does not lie, cheat, or steal or tolerate those who do".

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System

For additional information, please visit www.tamu.edu/aggiehonor/

Course Content:

Dr. Smith Section
Lecture 1: Introduction. When, where, and success of plant breeding
Lecture 2: Mendelian genetics -Symbols -Segregation ratios % of plant breeding grade
Lecture 3: Effects of selfing and selection
Lecture 4: Breeding methodology used with self-pollinated species
Lecture 5: Pure line -Bulk -Mass -Pedigree -Backcross
Lecture 6: Mendelian genetics applied to cross-pollinating species -Hardy-Weinberg
Lecture 7: Effects of selection in cross vs. self-pollinated species
Lecture 8: Mating systems

Dr. Starr Section
Lecture 9: Introduction - review of concepts of plant disease, principles of disease control, and host resistance
Lecture 10: Mechanisms of resistance to disease

Lecture 11: Pathogen variation - virulence and races
Lecture 12: The Gene for Gene Theory - an explanation for some of the complexities of host and pathogen interactions
Lecture 13: Effects of resistance on the epidemic
Lecture 14: Guest Lecture- Dr. David Ragsdale
Lecture 15: Deployment of resistance genes
Lecture 16: Screening for resistance, assessment of disease incidence and severity
Lecture 17: Guest Lecture – Dr. Luis Prom, USDA sorghum pathologist
Lecture 18: Marker assisted selection
Lecture 19: Yield drag
Lecture 20: Last day of class

Dr. Medina Section
Lecture 21: Introduction – host plant resistance to insects
Lecture 22: Antixenosis
Lecture 23: Antibiosis
Lecture 24: Tolerance
Lecture 25: Locating sources of Resistance
Lecture 26: Techniques to measure resistance
Lecture 27: Factors affecting the expression of plant resistance to arthropods
Lecture 28: Inheritance of arthropod resistance
Lecture 29: Constitutive and induced resistance genes
Lecture 30: Transgenic arthropod resistance
Lecture 31: Arthropods biotypes and host races
Lecture 32: Plant resistance in arthropod pest management systems

Required Reading Assignments

Christeholm, S.T., Coaker, G., Day, B., and Staskawicz, B. J. 2006. Host-microbe interactions: Shaping the evolution of the plant immune response. Cell 124:803-814.

Cooke, B. M. 1998. Disease assessment and yield loss. Pp 42-72 in The Epidemiology of Plant Diseases. D. Gareth Jones, ed. Dordrecht, The Netherlands: Kluwer Academic Publishers

Deadman, M. L. 1998. Epidemiological consequences of plant disease resistance. Pp 123-137 in The Epidemiology of Plant Diseases. D. Gareth Jones, ed. Dordrecht, The Netherlands: Kluwer Academic Publishers

Fry, W. E. 1982. Principles of Plant Disease Management (Chapter 11, Use of plant resistance). NewYork: Academic Press.

Parlevliet, J. E. Identification and evaluation of quantitative resistance. Pp 215-248 in Plant Disease Epidemiology, K. J. Leonard and W. E. Fry (eds). New York:McGraw-Hill Publishing Company.

Suggested book

C. Michael Smith, 2010, Plant Resistance to Arthropods: Molecular and Conventional Approaches, Springer. The Netherlands. 432pp.