

Student Information¹ Syllabus (with Attachments)

COURSE: Ento. 402 Field Crop Insects (2-3), Credit 3.
HOURS: Lecture, T Th (12:45 - 1:35) Lab, T (2.20 – 5:00)
LOCATION: HEEP, Room 205, West Campus
INSTRUCTOR: Marvin K. Harris, Entomology Research Lab.,
Room 106, TAMU 77843-2475
979-845-9757 m-harris@tamu.edu

COURSE MATERIALS: CD-Rom and hand-outs and other materials will be made available for purchase or included with the course.

PRESENTATION OF COURSE: The lecture will constitute 50% of the course and the laboratory 50%. Lecture will be the traditional form of presentation and tested on in the same way. A paper assignment is also considered a part of the lecture.

The laboratory will consist of reviewing entomology and then studying selected commodities by identifying arthropods from preserved materials, identification keys, and tutorial assignments.

GRADING: <u>Lecture 50%</u>			<u>Laboratory 50%</u>	
Hour Exams (3)	= 60%		Lab Exams (4)	= 80%
Comprehensive Final *	= 30%		Collection	= 20%
Paper	= 10%			
X.5		+	X.5	= Final Grade

*Final exam may include material from the laboratory which you were responsible for.

¹Students are encouraged to discuss any questions which arise concerning this course with the instructor or lab assistant(s) at any time. If unavailable, please leave message.

NOTES TO STUDENTS:

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 Texas A&M University community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/.

Plagiarism: As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings etc., which belong to another. In accordance with this definition, THE STUDENT IS COMMITTING PLAGIARISM IF HE OR SHE COPIES THE WORK OF ANOTHER PERSON AND TURNS IT IN AS HIS OR HER OWN, EVEN IF PERMISSION BY THAT PERSON HAS BEEN GRANTED. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. Plagiarism will not be tolerated in this course. Offenders of this policy will be punished according to University policies, which may include being expelled from the Institution. In addition, there will be no cheating of any type tolerated in this course.

If the student has any questions regarding plagiarism, please consult the latest issue of *Texas A&M University Student Rules*, under the section "Scholastic Dishonesty"

The Americans with Disabilities Act: 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 a student believes he or she has a disability requiring an accommodation, he or she should contact the Office of Support Services for Students with Disabilities in Room 126 of the Koldus Building (845-1637) so that such accommodations can be made. If a student needs these services, let us know before the first examination.

Skills Obtainable from Entomology 402

1. Development of a Data Base

Information is power and access to it can be developed through memorization of "facts" and through memorizing "sources." Both are essential components of a database. Facts include generalizations like "Experience has shown that the prophylactic use of an insecticide is bad because: 1) pesticide resistance usually develops in the target insect and/or in associated pest species, 2) pollution occurs, and 3) it is expensive." The educated person knows these generalizations and has some appreciation for their limitation. To continue with the above example, however, "petroleum oil used as an insecticide is relatively non-pollutive, inexpensive and pesticide resistance in a target arthropod, for which treatments have been effective, has never been shown to occur." Facts also include specific bits of information like "The female cabbage looper, *Trichoplusia ni* (Hubner), lays its eggs singly and deposits about 300 eggs during a typical 1-3 week adult activity period. One must have some of these facts at their immediate disposal if they are to function effectively as a professional.

Sources represent repositories of information. These act as extensions of our minds and supplement our personal database represented by our memory. Books, journals, videotapes, radio programs, newspapers, and other people may be sources. The professional is able to discriminate among these sources to determine the most reliable one for one's needs. The book by Metcalf, Flint and Metcalf on *Destructive and Useful Insects* is probably a better source about cabbage insects than is your roommate, for example. But is it a better source than a refereed journal, or a trade journal or a letter to the editor by a cabbage grower to your local newspaper? You must know something about the subject to judge that.

Thus, building your database requires a mixture of memorized facts and development of sources on which you rely for information. Memorized facts are needed to bring you up to cruising speed in the discipline and memorized sources let you reliably expand your skills into related areas.

2. Identification and Diagnostic Skills

Solving an insect problem begins with diagnosis. Is this an insect-related problem or something else like disease, or frost damage or herbicide damage or drought stress, etc? The ability to recognize insects and their damage begins with a differentiation of insect from non-insect damage and then emphasizes identification of the kind of insect involved. There are more than 10,000 different kinds of pest arthropods. You already know how to identify adult forms to order (Lepidoptera or moths, Homoptera or aphids, etc.). The new skill will be identification of immature forms to Order like relating caterpillars, grubs, nymphs and maggots to say Lepidoptera, Coleoptera, perhaps Hemiptera and Diptera, respectively. This information will be combined with your knowledge of damage, the host affected, and your information sources to obtain a diagnosis. Selected species of specific pests will be studied in detail.

3. Evaluation Skills

Given a database and a diagnosis, one should be able to evaluate the insect problem. How bad is it? Will it get worse? Is action needed now, or later, or both, or neither, and why?

4. Management Skills

The management tools available for insects include: chemical, biological, mechanical, cultural, legislative, etc. and the professional can choose which tool or combination will provide the best results in the short and long term.

5. Overview Skills

This is getting the big picture into some semblance of focus and outlining a plan of evaluation and action, i.e., how can we manage arthropods on a commodity like cotton or alfalfa or sunflower or corn? You must know the commodity, from the standpoint of the producer, the consumer and associated people; the arthropod complex-pests, their natural enemies and associated arthropods; and direct and indirect effects of management of target and non-target organisms as well as the environment. Politics, economics and ethics are involved, as well as science.

6. Communication Skills

The ability to clearly and concisely express information orally and in writing, are assets that clients value. Employers, customers and colleagues will appreciate the sizzle along with the steak. You must master 1-5 to fully take advantage of 6, for, like the Venus de Milo pitcher, a great appearance on the mound doesn't mean much if you can't deliver the ball.

Please keep these points in mind as we wade through the material that is in Ento. 402.

Procedures for Paper for Ento. 402 (Field Crop Insects)

1. Choose 1 insect associated with 1 crop for your paper.
2. Develop a "key word" list to use in searching the literature. I suggest the Bibliography of Agriculture, the Review of Applied Entomology or Bio Abstracts as a good beginning point. However, you will probably use Google on the net. Key words may include the scientific and/or common name of the insect, the scientific and/or common name of the crop, particular areas you may wish to emphasize such as biological control, host plant resistance, etc.
3.
 - a. Conduct a preliminary literature search designed to uncover general papers regarding the biology and life history of the insect, cropping practices of the crop plant chosen, and the general interaction of the plant and the insect. Factors such as value of the crop, geographical origin and present distribution, crop phenology, insect origin and present distribution, value or damage of insect to the crop, and insect and crop management practices are of particular interest.
 - b. Each reference which is of enough interest to cause you to consult the paper should be recorded on a file card (3" x 5" or 4" x 6" etc.) containing the following information: Reference properly cited, source of the reference (this may be coded, i.e., B 76 1 147 = Bioabstracts 1976 volume 1 page 147), and pertinent information which you will use to develop your paper. Three refereed journal references must be included, as a minimum, in your paper. Web pages may be cited as a source for references, and properly cited web sources can be used in your paper as well. The file cards are a part of your paper and will be turned in with it. Note that each reference found need not be incorporated into the actual paper.

Stated another way, if the title and/or abstract found in the indexing journal (and/or web-search) indicates the article is of no use to you, no record is made. However, where you intend to consult the original article, a file card must be begun at that moment by properly citing the article and the source of the reference. Then, when the original paper is consulted, notes of interest may be added on the card for later use.
 - c. After developing your file cards and having consulted the original articles, the breadth and depth of the information available on your chosen subject should begin to be apparent to you. At this point, you should assess the paper that you want to write versus the paper you can write. Identify gaps in information you want and attempt to locate them. This may require different key words, consulting general textbooks, extension literature, etc. Again, maintain a card file as above.
4.
 - a. Write the paper.
 - b. Use appropriate sections to organize your information. For example: Introduction; State the objective of your paper, Crop Section; general information regarding the crop, Insect Section; general information about the insect, Management Section; discuss the insect plant interaction and how to maximize benefits and minimize losses, Conclusions; draw those conclusions which are appropriate. You may insert your own views here and differentiate them from referenced sources.
 - c. Cite the literature using author(s) and year in the text (i.e.: Harris 1972) and report the

literature at the end alphabetically by senior author+other authors+yr+title+Journal pp+Publisher.

5. First draft of papers are due the Tuesday before spring break. Papers will be reviewed, edited, graded and returned. Then, I will allow two weeks for submission of the final copy.

GENERAL COMMENTS

The purpose of this exercise is to help you access and use the entomological literature, to assist you in developing scientific writing skills, and to allow you to concentrate part of your effort in this course to an area that is of particular interest to you. The primary criterion on which you choose a subject for your paper should be because you want to know more about it.

OBJECTIVES FOR THE FIRST LAB EXAM

1. Seven major insect orders.
2. Percent of arthropods and insects in the categories of life.
3. Seven categories of the classification of life.
4. Binomial nomenclature.
5. Nomenclature suffixes.
6. Difference between a bug and an insect.
7. Difference between a house fly and a dragonfly.
8. Three insect body regions.
9. Four types of insect metamorphosis.
10. Insect leg parts.
11. Types of mouthparts.
12. Types of larvae.
13. Types of pupae.
14. Two subphyla of Arthropoda.
15. Order of mites.
16. Classes of Mandibulata.
17. I.D. Mandibulata with key.
18. Order of sowbugs.
19. What is a symphylan?
20. Subclasses of Insecta.
21. Division of Pterygota.
22. Three beneficial orders.

23. Characteristics of insect orders.
24. Phyla of Nematodes.
25. Phyla of Gastropods.
26. I.D. Adult and immature insects with the key.

MAJOR EVENTS IN THE HISTORY OF PEST CONTROL
From Flint & Van Den Bosch, A Source Book on Integrated Pest Management

<u>Date</u>	<u>Event</u>
400,000,000 B.C.	First land plants
350,000,000 B.C.	First insects
250,000 B.C.	Appearance of <i>Homo sapiens</i>
12,000 B.C.	First records of insects in human society
8,000 B.C.	Beginnings of agriculture
4,700 B.C.	Silkworm culture in China
2,500 B.C.	First records of insecticides
1,500 B.C.	First descriptions of insect pests
950 B.C.	First descriptions of cultural controls (burning)
300 A.D.	First record of use of biological controls (predatory ants used in citrus orchards in China)
1650-1780	Burgeoning of insect descriptions (after Linnaeus) and biological discoveries in Renaissance
1732	Farmers first begin to grow crops in rows to facilitate weed removal
1750-1880	Agricultural revolution in Europe
early 1800's	Appearance of first books and papers devoted entirely to pest control
1840's	Potato blight in Ireland (no controls available to curb disaster)
1870-1890	Grape phylloxera and powdery mildew controlled in French wine country (introduction of Bordeaux mixture, Paris Green, use of resistant roots talks and grafting)
1880	First commercial pesticide spraying machine

1888	First major biological importation success (vedalia beetle for control of cottony cushion scale)
1890's	Introduction of lead arsenate for insect control
1896	Recognition of arthropods as vectors of human disease
1896	First selective herbicide (iron sulfate)

Major Events (continued)

<u>Date</u>	<u>Events</u>
1901	First successful biological control of a weed (Lantana in Hawaii)
1899-1909	Development of strains of cotton, cowpeas, and watermelon resistant to <i>Fusarium</i> wilt (first breeding program)
1912	U.S. Plant Quarantine Act
1915	Control of disease-vectoring mosquitoes allowed completion of Panama Canal
1921	First aircraft spray (in Ohio for catalpa sphinx)
1929	First area-wide eradication of an insect pest (Mediterranean fruit fly in Florida)
1930's	Introduction of synthetic organic compounds for plant pathogen control
1939	Recognition of insecticidal properties of DDT
1940	Use of milky disease to control Japanese beetle (first successful use of insect pathogen for control)
1940's	Organophosphates developed in Germany, carbamates in Switzerland
1942	First successful breeding program for insect pest resistance in crop plants (release of wheat strain resistant to Hessian fly)

1944	First hormone-based herbicide (2, 4-D)
1946	First report of insect resistance to DDT (housefly in Sweden)
1950's 60's & 70's	Widespread development of resistance to DDT and other pesticides
1950's	First applications of systems analysis to crop pest control
1959	Introduction of concepts of economic thresholds, economic levels and integrated control
1960	First insect sex pheromone isolated, identified and synthesized (gypsy moth)
1962	Rachel Carson's <u>Silent Spring</u>
1972	Nixon establishes the Environmental Protection agency by Executive Order, and Banning of DDT in United States

Note events since 1972 would include development of synthetic pyrethroids, insect growth regulators and other chemicals as insecticides, genetic engineering of plants for insect and pathogen control, and patenting allowed for plant genes, to name a few.