

**Iraqi Kurdistan Region  
Ministry of Higher Education  
and Scientific Research  
University of Salahaddin  
College of Agricultural  
Engineering Sciences  
Dept. Plant Protection**



## **Course book**

**Department: Plant Protection/2<sup>nd</sup> Stage**

**Subject: Theoretical & Practical**

**Insect Ecology / Semester : Spring**

**Lecturers: Dr. Khalid Q. Khidher**

**Ms. Srwa Masud Khalil**

**Academic Year: 2022-2023**

<b>1. Course name</b>	Theoretical Insect Ecology Practical Insect Ecology
<b>2. Lecturer in charge</b>	Dr. Khalid Q. Khidher Srwa Masud khalil
<b>3. Department/ College</b>	Plant Protection/Agriculture
<b>4. Contact</b>	<b>E. mail</b> <a href="mailto:Khalid.Khidher@su.edu.krd">Khalid.Khidher@su.edu.krd</a> <b>+964 07504439239</b> <b>Email :</b> <a href="mailto:srwa.khalil@su.edu.krd">srwa.khalil@su.edu.krd</a> <b>07504145411</b>
<b>5. Time (in hours) per week</b>	2 hours 6 hours
<b>6. Office hours</b>	All the days of week except Friday and Saturday.
<b>7. Course code</b>	
<b>8. Teacher's academic profile</b>	<p>Date of Birth: 10<sup>th</sup> June, 1982 Place of Birth: Erbil Nationality: Iraqi Marital Status: single Sex: Male</p> <p><b>Education:</b> Doctor of philosophy (PhD) in Entomology, Economic Entomology, graduated from Salahaddin University-Erbil, College of Agricultural Engineering Sciences- Plant Protection-2022.</p> <p>Bio-ecological study and management of sesame webworm, <i>Antigastra catalaunalis</i> (Duponchel) (Lepidoptera: Crambidae) on some varieties of Sesame in Erbil Governorate Supervised by: Assist. Prof. Dr Abdulbaset M.A. Mohamed and Assist. Prof. Dr. Nawzad B. Kader.</p> <p>My master degree (MSc) in Entomology, Plant Protection Department, graduated from Salahaddin University-Erbil, College of Agricultural Engineering Sciences - Plant Protection -2012. My Theses Title: Biology and Ecology of Corn Stem borer, <i>Sesamia cretica</i> (Led.) (Lepidoptera: Phalaenidae) on Corn Crop and the Evaluation of Some Damages in Erbil City Supervised by: Assist. Prof. Adel O. Abdulwahid</p> <p>My Bachelor degree(BSc) in Plant Protection Department- College of Agriculture, Salahaddin University-Erbil-Iraq</p> <p><b>Lecturer of Practical Part:</b> <b>Education:</b> Srwa Masud Khali , born 1986 BSc. In plant protection 2004-2008. 1<sup>st</sup> of the 10<sup>th</sup> BSc degree , started working as an academic staff (teaching</p>

assistant) in 18-3-2009 in the college of Agriculture / plant protection department Salahaddin university , taking post graduate courses for 8 month in college of agriculture plant protection department in Duhok university getting MSc. Degree In economic entomology working as an assistant lecture in also member in agriculture engineering syndicate in Hawler , taking a course on teaching method in 2014 , The same University ( Salahaddin)

Web site : srwa masud ,

Giving a post graduating course of Acarology to students in 4<sup>th</sup> class also biological control and pesticide course to 3<sup>rd</sup> class

Working in two researches

:1- comparison between manual and molecular counting of cotton aphid on okra in Erbil governorate

2-bio-morphological study of *Calliphora vicina* in Erbil governorate

### **Work History: (1)**

As an assistant agricultural engineer in plant protection department my duties are:

- 1- Assisting assistant lecturer in teaching Practical Plant Taxonomy.
- 2- Assisting assistant lecturer in teaching Orchard insects.
- 3- Assisting assistant lecturer in teaching Biological control.
- 4- Assisting with assistant lecturer in teaching field crop insects.
- 5- Assisting assistant lecturer in teaching field crop disease.
- 6- Assisting assistant lecturer in teaching Plant pathology.
- 7 Assisting assistant lecturer in teaching Pesticides
- 8- Assisting assistant lecturer in teaching Forest insects.
- 9- Assisting assistant lecturer in teaching Acharosat
- 10-I was a member of a welcoming new acceptance students committee (2008-2009) whom get in to Agriculture college.
- 11- I was a member in examination committee 1st trial (first & 2<sup>nd</sup> trial, 2009).
- 12- As an assistant lecturer in Plant protection department my duties are:
- 13- Assistan lecturer in teaching Practical insects Physiology.
- 14- Assistan lecturer in teaching Practical insects Ecology.
- 15- Assistan lecturer in teaching Practical insects Taxonomy.
- 16- As a Lecturer 20017- 2020 in teaching Theoretical & Practical Insects ecology & Physiology 3<sup>rd</sup> year.
- 17- I was a head of Social committee of the department.(20017- 2019).
- 18- I was a member of committee of the College .(20018- 2019).
- 19- I was a member of Scientific committee of the department (2017,2018)
- 20- I was a member of committee of the department

### **Work History: (2)**

<b>9. Keywords</b>	Theory Insect Ecology, Insect ecosystem, Insect population, Environmental factors. Practical Insect Ecology, Insect Sampling, Insect Survey, Insect Population
<p><b>10. Course overview:</b> The course includes fundamental lectures in insect ecology in a Theoretical format such as an introduction to insect ecology, population ecology of insects, We will cover major principles of ecology as they apply to insects, how ecologists study these components of insect ecology, and how this information can be applied to conservation, agriculture, and public health issues. The course will follow a level of organization from the individual, to populations and finally, to communities. The diversity of insects is far too great to cover in a single quarter course. Rather than try to be overly inclusive and provide examples from this great diversity, the course will mainly focus on terrestrial insects then aquatic insects if time allowed.</p> <p>The course includes fundamental lectures in insect ecology in a practical format such as an introduction to insect ecology, population ecology of insects, insect surveys, insect sampling methods and sampling equipments. We will cover major principles of ecology as they apply to insects, how ecologists study these components of insect ecology, and how this information can be applied to conservation, agriculture, and public health issues. The course will follow a level of organization from the individual, to populations and finally, to communities. The diversity of insects is far too great to cover in a single quarter course. Rather than try to be overly inclusive and provide examples from this great diversity, the course will mainly focus on terrestrial insects then aquatic insects if time allowed.</p>	
<p><b>11. Course objectives:</b> The objectives of this course are to teach the students to deal with the fundamentals of insect ecology in the theory underlying. The components of the environments such as biotic &amp; abiotic factors, the influences of environment on the insects such as predators, prayers, Mimicry, immunity, concepts of balance of life.....etc.</p> <p>The objectives of this course are to teach the students to deal with the fundamentals of insect ecology in practice such as insect surveys, insect sampling methods, the theory underlying sampling, the need to calibrate samples, the design of sampling programs, and to evaluate the use of different sampling techniques. Thus, the main objectives are summarized in the following points.</p> <ol style="list-style-type: none"> <li>1) Gain an understanding of ecological principles as they pertain to insects.</li> <li>2) Gain an appreciation and knowledge of the natural history of insects.</li> <li>3) Gain an understanding of scientific inquiry associated with insect ecology.</li> </ol>	
<p><b>12. Student's obligation</b></p> <p><b>A. Attendance:</b> Attendance is mandatory. You should attend all the classes on time otherwise; you may miss important discussions that may arise during the class. Such material may be asked on exams. Additionally, If the student doesn't attend the class for more than 3 lectures, the student will be fired, considered as fail and must repeat the course for the next academic year. The lectures will be taken at Department hall.</p> <p><b>B. Exams:</b> Students missing their exam with no valid reasons or deceiving during the exam, the grade for the exam will be zero and eventually may be fired.</p>	

**C. Make-up exams or other work:**

Arrangements for a makeup exam (required because of a valid reason) must be made at least 3 days prior to the exam. If the student misses an exam due to a medical or family emergency (accompanied by a note from a medical professional), a makeup exam will be scheduled as soon as the student returns to the class.

**D. Class demeanour expected by instructor:**

Be kind, considerate and respectful of others; Mobile phones should be turned off and no texting. The cooperation of the students to each other during the class lectures and field visits are highly appreciated.

**13. Forms of teaching**

Various forms of teaching will be used during the course including:

1 Information will be explained using a white board, videos, etc.

3- Scientific Trip: by the end of this course or may be sooner, A scientific trip will be arranged to a specific site (e.g. Sheraswa) to review the information learnt during the course in a more practical form.

**14. Assessment scheme**

The whole grade will be **50** degrees and are divided as the followings:

**Marks distribution of 15% (Theoretical part)**

Test	Mark 15%
Monthly Examination	10
Weekly Quiz	3
Report	2
Total	15

**Marks distribution of 35% (Practical part)**

Monthly exam	20
Quizzes	5
Reports	5
Samples	5

**Final examination out of (50%)**

**15. Student learning outcome:**

By the end of this course, the students are expected to:

1-Learn the concepts of insect ecology such as insect autecology & synecology, Insect dispersal, Population fluctuation; biotic & abiotic factors affected insects , and its abundance.

2- Get familiar with major insect pests in agricultural lands.

3- Get familiar with the beneficial insects such as honey bees, pollinator insects and insects used in biological control programs and the ways of preserving such beneficial insects.

**16. Course Reading List and References:**

**A- Useful books :**

- 1- Gibb, T. J. & Oseto, C. Y. 2006. *Arthropod collection and identification: field and laboratory techniques*, Academic Press.
- 2- Price, P.W., Denno, R.F., Eubanks, M.D., Finke, D.L. and Kaplan, I. (2011) *Insect ecology: behavior, populations and communities*, Cambridge University Press.
- 3- Schowalter, T.D. (2011) *Insect ecology: an ecosystem approach*, Academic Press.
- 4- Varley, G.C., Gradwell, G.R. and Hassell, M.P. (1974) *Insect population ecology: an analytical approach*, Univ of California Press.
- 5- Ward, J.V. (1992) *Aquatic insect ecology. 1. Ecology and habitat*, John Wiley & Sons, Inc.

**B- Useful websites:**

- 1- Sampling Methods for Forests and Shade Tree Insects of North America Vols. I and II available at <http://www.sampforestpest.ento.vt.edu/>
- 2- Insect scouting guidelines available at <http://extension.udel.edu/ag/tag/insect-scouting-guidelines/>

**17. Theoretical Topics (Course Syllabus):**

Weeks	
1	Ecology-introduction- autecology and synecology-population,
2	Abiotic factors, Temperature, Moisture and Rainfall
3	Light-phototaxis, photoperiodism
4	Biotic factors- <i>Food</i> -classification of insects according to nutritional requirements- <i>other organisms</i> -inter and intra specific associations-beneficial and harmful associations of Parasitoids based on site of attack, stage of attack, duration of attack, degree of parasitism and food habits.
5	1 <sup>st</sup> Examination.
6	Concept of balance of life
7	Defense & mimicry in insects
8	Social insects, types of sociality
9	Insect-borne diseases
10	2 <sup>nd</sup> Examination.
11	Insects in a changing climate.
12	Study of behavior and orientation of insects- repellency, deterrancy and stimulation
13	Study of terrestrial and aquatic ecosystems of insects.
14	Study of pollinators, weed killers and scavengers.
15	Study of distribution patterns of insects in crop ecosystems.
16	Conservation of insect diversity.
	Insect-borne diseases
<b>17. Practical Topics (Course Syllabus):</b>	
Weeks	Lecture name

1	An introduction to insect ecology, Surveys of Insect pests, sampling programs, Importance of insect sampling, estimating the abundance and predicting population dynamics.
2	Survey and assessment of insect population density, methods of insect survey
3	Insect survey techniques
4	Insect collecting equipments
5	First Monthly Exam
6	Insect Sampling methods
7	Ecology of aquatic Insects
8	Forest Insect ecology
9	Field (Scientific ) Trip
10	Some examples for Insect sampling: Sunn pest and Red Pumpkin Beetle
11	Thrips in some crops
12	Melon fly and grasshoppers
13	Second monthly exam
14	Aphids as agricultural pests
15	Leaf hoppers
16	Leaf miners

## 18. Examinations:

### 1. Compositional

#### Q1

Define the following terms

1-Insect ecology 2-community 3- ecosystem .....etc.

#### A

1- Insect ecology: Is the study of interactions between insects and their environment.

2- A community usually refers to all the organisms within an area. We can also talk about a community of some type of organism, such as the community of Aphids on Citrus trees in California.

3. An ecosystem refers to all the organisms within an area and the abiotic factors that affect it.

#### Q2

Compare between biotic and a biotic factors?

Biotic factors refer to other organisms that interact with an organism or species, or the organic products of those organisms. Examples of biotic factors include: the species that produce the food (primary producers) eaten by an organism, species that feed on and harm the organism (consumers), including: predators: species that kill and eat their prey and have no long term interaction with them, parasites: species that live on or in their host over a long period of time and harm, but are unlikely to directly kill, the host, Parasitoids species whose eggs are laid on the host (typically on the larval stages of insect hosts) and which then develop in or on the host, harming it as parasites.

*Abiotic factors* refer to non living aspects of the environment that affect an organism, such as temperature, moisture and humidity, rainfall, light, atmospheric pressure, air currents, water, oxygen, pH, salinity, place

to live .

### Q3

Fill in the blanks with the best word or phrase for each of the following sentences:

Insect ecology has two main goals which are ..... and .....

### A

Basic and Applied goals

2. True or false type of exams:

Answer the following sentences (**True or False**)

1- *Abundance* refers to how many organisms occur a- True b- False (Answer is a- True).

2- Ecology is the multi-disciplinary subject, and derives support from such sciences as meteorology & geology.

a- True b- False (Answer is a- True)

3- Temperature indirectly influences the distribution of insects in nature.

a- True b- false (Answer is b- false)

3. Multiple choices:

Choose the correct answer for each of the following sentences:

1- Warm blooded animals is called :

a- ( Exothermic b- Endothermic c- Poikilothermic ) . (Answer is c).

2- Zone of Fatal Low Temperature is

a- (-14 oC ) b- ( 10 oC ) c - ( -14oC to -5oC ) (Answer is c



## 20. Peer rev.

### 19. Examinations:

#### 1. Compositional

##### Q1

Define the following terms

1-Insect ecology 2- Sweeping 3- Sampling unit

##### A

1- Insect ecology: Is the study of interactions between insects and their environment.

2- Sweeping: Is a method used to collect insects (Flying) through sweeping grasses, herbage, vegetables etc. e.g. Butter fly, grasshoppers, and leaf hoppers.

3- Sampling Unit: Is a proportion of habitable space from which insect counts are taken.

##### Q2

Compare between sticky traps and bait traps for collecting insects

##### A

Sticky traps and bait traps both are methods used for collecting insects. In sticky traps, different color of traps are used such as yellow and blue with a sticky material whereas in bait traps, any kind of bait can be used which is used to attract insects such as grains, flour, sugar, etc. and the color is not important. Sticky traps do not catch non flying insects and insects get messy whereas in bait traps, it catches both flying and non-flying insects. Bait traps can be put anywhere in the field and the soil whereas sticky traps cannot be put in the soil.

##### Q3

Fill in the blanks with the best word or phrase for each of the following sentences:

Insect ecology has two main goals which are .....and.....

##### A

Basic and Applied goals

#### 2. True or false type of exams:

Answer the following sentences (**True or False**)

1-We can survey insects from the soil using sweep nets and sticky traps.

a- True b- False (Answer is b- false)

2-Sampling technique is a proportion of habitable space from which insect counts are taken.

a- True b- False (Answer is b- False)

3-Light traps are used for collecting nocturnal insects

a- True b- false (Answer is a-true)

### 3. Multiple choices:

Choose the correct answer for each of the following sentences:

1- The economic threshold level for sunn pest adult is :

a- 1 adult/m<sup>2</sup> b- 2 adult / m<sup>2</sup> c- 3 adult / m<sup>2</sup> (answer is a-1 adult/m<sup>2</sup>)

2-Sticky traps are used for collecting :

a- non-flying insects b- flying insects c- both flying and non-flying insects. (answer is b- flying insects)

3- The method used for collecting insects in the absence of the collector is called:

a- Sweeping b- Visual counting c- Trapping (answer is c- trapping).

### 20. Peer review