



**Department of Plant protection**

**College of Agricultural Engineering science**

**University of Salahaddin**

**Subject: Plant Physiology**

**Course Book – (Year 2)**

**Lecturer's name Asst. Prof. Dr.Iqbal Murad Dhahir**

**Lecturer's name:-Zhala M. Ameen. (MSc)**

**Academic Year: 2020-2021**

## Course Book

1. Course name	Plant Physiology
2. Lecturer in charge	
3. Department/ College	Plant Protection/ Agricultural Enginreenig Science
4. Contact	e-mail: iqbal_alrawi@yahoo.com Tel: (07504701191) g-mail: zhalaameen@su.edu.krd Tel: (optional)07504650151
5. Time (in hours) per week	Theory: 2 Practical: 3
6. Office hours	Availability of the lecturer to the student during the week
7. Course code	
8. Teacher's academic profile	<p><b><u>Education and Qualifications</u></b></p> <p><b>(A) Schooling</b> 1972 - 1977 : ninawa Primary School. Mosul, Iraq. 1978 - 1983 : Kurtoba Secondary school, Mosul, Iraq.</p> <p><b>(B) University</b> 1984 – 1987: Graduating for B.Sc. in Biology Dep., College of Science, Mosul University, Iraq.</p> <p>1990 – 1992: Postgraduate students for M. Sc. degree at Biology Dep., College of Science, Mosul University, Iraq.</p> <p>2008-2011: Postgraduate student for Ph.D. degree at Field Crops Dep. Agriculture College, Salahaddin University, Erbil, Kurdistan Region, Iraq</p> <p><b><u>Employment</u></b> 1992 – 1997: Assist. Lecturer at Basic Science Section, Mosul University, College of Agriculture &amp; Forestry, Mosul University. Iraq.</p>

	<p><b>1998 – 2000: Assist. Lecturer at Plant Production Dept. Agriculture College. Duhok University, Duhok, Kurdistan Region, Iraq</b></p> <p><b>2000 – 2002: Assist. Lecturer at Plant Production Dept. Agriculture College. Salahaddin University, Erbil, Kurdistan Region, Iraq</b></p> <p><b>2003 – 2008: Lecturer at Plant Production Dept. Agriculture College. Salahaddin University, Erbil, Kurdistan Region, Iraq.</b></p> <p><b><u>Professional Experience</u></b></p> <ol style="list-style-type: none"> <li><b>1. General Botany</b></li> <li><b>2. Plant Physiology</b></li> <li><b>3. Genetics</b></li> <li><b>4. Plant Taxonomy</b></li> <li><b>5. General Biology</b></li> </ol> <p><b>BSc. Agriculture, Salahaddin University-Erbil 2003-2004.</b>  <b>MSc Plant Physiology, Salahaddin University, 2012-2013</b></p>
<p><b>9. Keywords</b></p>	<p>Plant physiology; plant structure and functions; Plant tissues; Photosynthesis; Plant Respiration ; Plant water relations; water Balance of Plants; Water and mineral absorption; plant growth Hormones .</p> <p><b>Plant Physiology, Growth Analysis , Solution,Permeability, Determination,Estimation, Auxin, Gibberellins.</b></p>
<p><b>10. Course overview:</b></p>	<p>The course includes fundamental lectures in plant physiology, water relation, photosynthesis, respiration and the relation between plants and their environment...etc.</p> <p><b>Plant physiology study plants at many levels, including studies of the whole plant, plant tissues, isolated cells and organelles. In this course, we will focus primarily on three major aspects of plant physiology (plant physiology, growth analysis, factory affecting the permeability of plant cell membranes, determination of the water potential by tissue weight-change method, estimation of water content in different angiospermic seeds, measurement of transpiration rate, determination the number of stomata, solution, bioassay for auxin, gibberellins). The field of plant physiology includes the study of all the internal activities of plants. Major subdisciplines of plant physiology include (biochemistry of plant, disease of plant).</b></p>

### **11. Course objective:**

The course will cover texts on review of some information about plant physiology: What is plant? Why study plant physiology? The functions of the parts of plants. The relations between plants and their environment, photosynthesis and respiration, Water Balance of Plants (Water absorption, Water Transport, & Transpiration) (Solute Transport), Water and mineral absorption, Transpiration and plant growth Hormones.

**The course will cover texts on plant physiology, plant physiology is an integrative discipline that asks and attempts to answer questions about plant form and function. Plant physiologists study plants at many levels, including studies of the whole plant, plant tissues, isolated cells and organelles. modern plant physiologists increasingly use tools of molecular biology to study plant gene expression in order to understand show it is regulated and how gene expression, in turn, regulates plant function. In this course, we will focus primarily on three major aspects of plant physiology: plant water relations, biochemistry and metabolism, and growth, development, fundamental processes such as photosynthesis, respiration, plant nutrition, plant hormone functions, tropisms, nastic movements, photoperiodism, photomorphogenesis, circadian rhythms, environmental stress physiology, seed germination, dormancy and stomata function and transpiration, both part of plant water relations, are studied by plant physiologists.**

### **12. Student's obligation**

In this section the lecturer shall write the role of students and their obligations throughout the academic year, for example the attendance and completion of all tests, exams, assignments, reports , essays...etc.

**-The students must contribute in the scientific discussions in the lab. The obligation of the student in this course includes attendance in the lectures and listening teachers carefully, when working with chemicals, avoid skin contact and keep your hands away from your mouth ,wash all lab glass ware at the end of the period, wash your hands with soap and water before leaving the lab, skin about new terms in the lab, The students must know the importance of quizzes, homework and exams.**

### **13. Forms of teaching**

Different forms of teaching will conducted to gain the objectives of the course, such as:

1. Power point presentations.
2. Practical lecturers.

**The form of teaching is including use of Microsoft PowerPoint at the class to present the lecture, using white board, using data show, and give the lectures to the student by Microsoft word for each lecture, demonstrate the identification of physiological issues and its impact of the crop fields.**

### **14. Assessment scheme**

Students are required to conduct two writing tests in each theoretical and practical lectures, each exam will be on 100 mark then it will transferred to 40 mark, 25 on writing test, while 15 mark for practical lectures. The final examination will be on 60 marks, 20 practical and 40 theoretical.

**Practical part: two exam 15, quiz and report with presentation from 5, total is 20 mark**

### **15. Student learning outcome:**

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

- 1- Learn the concept of plant physiology science.
- 2- How plant get water.
- 3- How plant make food.
- 4- Respiration of plant.
- 5- The main tissues of plant.
- 6- The main theories of plant physiology.

**Plant physiology includes the study of biological and chemical processes of individual plant cell. We will study the effect of temperature stress and selected chemicals on cellular membranes of root of plant. Deals with interactions between cells, tissues, and organs within a plant. Different cells and tissues are physiologically and chemically specialized to perform different functions. Roots and rhizoids function to anchor the plant and acquire minerals in the soil. Leaves function to catch light in order to manufacture nutrients. Plant physiologists study the ways that plants control or regulate internal functions. like plants produce chemicals called hormones which are produced in one part of the plant to signal cells in another part of the plant to responded.**

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

1. Heldt, Hans- Walter.(1999). Plant biochemistry and molecular biology. Oxford university press. Great Britain.
2. Hopkins,G.William & Norman,P.A.Huner . (2004). An introduction to Plant Physiology. John Wiley & Sons .USA.
3. Nath, Ravindra. (2003). Principles of Modern Botany. Kalyani Publishers. New Delhi. India.
4. Raven, Peter.H., Ray,F.Evert,.& Susan, E.Eichhorn.(1999). Biology of Plants. W.H. Freeman and company publishers. USA.
5. Sharma, Rajni. (2004). An introduction to plant physiology. Campus Books International. New Delhi. India.
6. Taiz, Lincoln & Eduardo Zeiger. ( 2006). Plant Physiology. Sinauer Associates,inc publishers.USA.
7. Taiz, Lincoln & Eduardo Zeiger (1998). Plant Physiology. Sinauer Associates,inc publishers.USA.
8. Devlin,R. M. (1975).Plant Physiology.
9. Wilfred, W. R.; T. E. Weier and C. R. Stocking (1957). Botany an introduction to plant science.
10. William, c. D. (2000). Handbook of Integrative Plant Anatomy.
- 11.Nnath, Ravindra. (2003). Prrinciples of Modern Botany. Kalyani Publishers. New Delhi. India.
12. V.K. Joan. (2008). Fundamental of Plant Physiology. 11<sup>th</sup> Revised Edition. S.Chand. & Company Ltd. Newedelhi. India.

**13. Taiz, Lincoln & Eduardo Zeiger. (2006). Plant Physiology. Sinauer Associates, inc 11.**

<b>17. The Topics:</b>		<b>Lecturer's name</b>
Week NO.	Subject	Asst. Prof. Dr. Iqbal. M. Dhahir
1 <sup>st</sup>	Introduction to plant physiology.	
2 <sup>nd</sup>	Architecture of plants: plant structure and functions.	
3 <sup>rd</sup>	=====	
4 <sup>th</sup>	Plant tissues.	
5 <sup>th</sup>	First examination	
6 <sup>th</sup>	<b>Photosynthesis</b>  <b>(Light reaction, Dark reaction &amp; physiological and ecological considerations)</b>	
7 <sup>th</sup>	=====.	
8 <sup>th</sup>	Plant water relations: Diffusion, Imbibition, osmosis, Plasmolysis, colloidal system in plants.	
9 <sup>th</sup>	=====	
10 <sup>th</sup>	<b>Plant Respiration</b>  <b>(Glycolysis, Citric acid cycle, &amp; electron transport chain)</b>	
11 <sup>th</sup>	Second examination	
12 <sup>th</sup>	<b>Water Balance of Plants</b>  <b>(Water absorption , Water Transport, &amp; Transpiration) (Solute Transport)</b>	
13 <sup>th</sup>	Water and mineral absorption. Transpiration.	
14 <sup>th</sup>	<b>plant growth Hormones</b>  <b>( Auxin, Gibberellins , Cytokinins Abscisic acid, &amp;Ethylene)</b>	
<b>18. Practical Topics (If there is any)</b>		

<b>Growth Analysis. Development. Objectives of growth analysis. Growth Indices .Crop Growth Rate. Relative Growth Rate. Net Assimilation Rate.</b>	<b>3hours 9/2/2019</b>
<b>Plant physiology. Solution. Solutes and Solvents. Solubility. Polar solvents. Non-polar solvents.Importance of water in plant life. Molecular structure of water. Emulsions. True Solution, Suspension and Colloidal Solution. Some important properties of colloidal solution. Difference between True Solution, Suspension &amp; Colloidal solution.</b>	<b>3 hours 16/2/2019</b>
<b>Factors affecting the permeability of plant cell membranes. Introduction for Plasma membrane. Materials &amp; Equipments. Procedure. The effect of temperature stress on cellular membranes. Observe the effect of temperature stress on cellular membranes. The effect of organic solvents stress on membranes.</b>	<b>3 hours 23/2/2019</b>
<b>Carbohydrates. Structure and types of carbohydrate Among the most important monosaccharides are glucose and fructose (a fruit sugar). Glucose. Oligosaccharides. Polysaccharides. Material and Methods. Procedure. Development of colour. Preparation of standard curve. Calculation.</b>	<b>3 hours 2/3/2019</b>
<b>First Examination.</b>	<b>3 hours 30/3/2019</b>
<b>The determination of the water potential of potato tuber tissue by tissue weight-change method. Introduction of Water potential. Materials and Equipments. Procedure. Calculations. Measuring water potential &amp; its components. Estimation of water content in different angiospermic seeds. Determination of the percentage of imbibed water by different angiospermic seeds. Introduction the imbibition. Materials &amp; Equipments. Procedure and Calculations.</b>	<b>3 hours 6/4/2019</b>
<b>Measurement of transpiration rate by transpiration decline curve method. Introduction of Transpiration. Materials and Equipments. Procedure. Determination the number of stomata and the stomatal index per unit area on both the surfaces a leaf. Introduction of Stomata. Materials and Equipments. Procedure.</b>	<b>3 hours 13/4/2019</b>
<b>Extraction and determination of chlorophyll. Introduction. Bioassay for Auxin. Bioassay for Gibberellins.</b>	<b>3 hours 20/4/2019</b>
<b>Extraction methods. Method extraction can be divided. Cold methods. Percolation. Hot method. Infusion. Decoction.</b>	



Practical:

**Q1- Define the following words:**

- 1- Plant Physiology.                      2- Growth.                      3- Cell membrane.  
4- Carbohydrate.                      5- Solution.                      (25 marks)
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**Q2- Compared between True Solution, Colloidal Solution and Suspension.  
(25 marks)**

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**Q3- A- Write the structure of (H<sub>2</sub>O) and (Sucrose).  
B- Draw the Plasma membrane.                      (25 marks)**

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**Q4- Answer the following?**

- 1- Factors that affects water absorption by root?
- 2- Vacuole importance in plant cells?
- 3- Types of transpiration in plants?
- 4- General properties of lipids?
- 5- Importance of osmosis phenomenon in plant life?

(25 marks)

**20. Extra notes:**

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**21. Peer review**