



Department of Horticulture

College of Agricultural Engineering Sciences

University of Salahaddin

Subject: Plant Physiology

Course Book – (Year 3)

Lecturer's name Prof. Dr. Sawsan Mohammad-Saeed

Kanimarani and Dr. Media Ezaddin MohammedAmin

Academic Year: 2022/2023

Course Book

1. Course name	Fall Semester
2. Lecturer in charge	
3. Department/ College	Horticulture/Agricultural Engineering Sciences
4. Contact	e-mail: Sawsan.ali@su.edu.krd Tel: 07504549671 e-mail: media.mohammedamin@su.edu.krd Tel: 0750375054
5. Time (in hours) per week	Theory: 2 Practical: 3
6. Office hours	2 hours
7. Course code	
8. Teacher's academic profile	<p>Dr. Sawsan Mohammad Saeed 1985-1986 graduated from Agriculture College 2001 Msc. in plant physiology 2009 Phd in plant physiology 2013 Asisst. Prof. 2021 Prof. Lecturer since 9-2001 in Agriculture college</p> <p>Dr. Media Ezaddin MohammedAmin 2000-2001 graduated from Agriculture College 2007 Msc. in plant Tissue Culture 2009 Phd in physiology of Ornamental Plants 2022 Lecturer</p> <p>Lecturer since 2008 in Agriculture college till now in Agricultural Engineering Sciences</p>
9. Keywords	Plant Physiology, Water Relations, Photosynthesis, Respiration, Transpiration
<p>10. Course overview: Plant physiology deals with different plant structures and their functioning. It enables analysing processes in plants, namely – photosynthesis, mineral nutrition, respiration, transportation, and ultimately plant development and growth which are traits displayed by living entities.</p> <ul style="list-style-type: none"> ▪ Plant Physiology is important to understanding the effects of environmental change on local and large-scale ecological health. ▪ Plant physiology is overlapped with its related branch of knowledge: biochemistry, 	

biophysics, and molecular biology. The basic knowledge of plant physiology, that is necessary for experts in agriculture.

- The course will cover the physiology of plants, how they develop and grow, and the principles and techniques that underlie each of their functions. In all facets of biology, the processes that enable the plant to adapt, endure, and procreate. inclusion of recent, fruitful research in the field. In order to broaden students' understanding of this type of life around them, it is necessary to analyse and travel through agricultural plants and plants related to humans. Along with theoretical explanations and laboratory-related experiments and clarification, the course will feature lectures.

- Plant physiology is a branch of study in Botany dealing with the physiological processes or functions of plants.

- In this context is about enabling strategies and innovations to ensure that the most basic of human needs.

11. Course objective:

These lectures are for undergraduate students studying plant physiology for the first time.

The purpose is to help students gain a solid foundation in fundamental concepts of plant physiology to illustrate how those concepts are supported by evidence from physiological, biochemical and biophysical experiments.

The text assumes that the student has completed courses in botany and chemistry in last year's, and it considers a base for those who will go on to advanced studies in agronomy, plant physiology and physiological plant ecology.

The practical part aims to acquire the student the practical skills which is related to the theoretical part of the plant physiology course, in which aims to:

- Introduce students to the importance of plant physiology and why it needs to be studied.
- Enable students to understand the importance of every physiological process that happens in the plant body.
- Make students be able to provide reasons for studying plant physiology.
- The student should be able to prepare and carry out practical experiments related to plant physiology and note down experiments as in a scientific method as:
 1. Title of experiment
 2. Tools used
 3. Steps
 4. Observation
 5. Comment
- Submit an oral and written full report on every experiment and discuss it with colleagues and teachers.

12. Student's obligation

Students are required to take quiz of the previous lecture every new lecture.

- Students are required to take two semester exams.
- Class attending is obligatory.
- Some times students are prepared reports, seminars and assignments.

For practical part The student must attend the Laboratory and prepare for the tests or experiment tests in the lab, make assignment reports, and quizzes.

13. Forms of teaching

- Power point presentation, explanations of figures, schemes, chemical reactions and equations.
- Some times the white board will be used for explanations.
- The students have lectures about the objectives, which depended on the mentioned references.

Practical part: Laptop is used to explain the lecturers, using the power point. Microscope also used sometime.

14. Assessment scheme

- Students are required to take quiz of the previous lecture every new lecture.
- Students are often required reports, seminars and assignments.
- Students are required to take two semester exams.
- Class attending is obligatory.

The following table includes Theoretical part:

Theoretical part	First exam	Second exam	Quiz, activity and report	Total quest	Final exam	Total
degree	13%	13%	2%	15	50	65%

15. Student learning outcome:

- Help students to gain a solid foundation in fundamental concepts of plant physiology to illustrate how those concepts are supported by evidence from physiological, biochemical and biophysical experiments.
- Help, to improve horticulture products by using critical and creative thinking and scientific methods.
- Describe how natural plant systems function and recognize the impact of plant behaviours in different environment and their effects on beneficial horticultural productivity.

16. Course Reading List and References:

The main refrence is:

- Taiz, L. and E. Zeiger (2006). **Plant Physiology**, 4th Edition. Senauer Assoc- iates, Inc. Publisher. USA.

- 1- Salisbury, F. B. and C. W. Ross (1985). **Plant Physiology**, 3rd Edition. Wadsworth Publ. Comp. Inc. Blemont, California U.S.A.
- 2- Hopkins, W. G. and N. P. A. Huner (2004). **Introduction to Plant Physiology**, 3rd edition. John Wiley and Sons, Inc.
- 3- Öpik, H. and S. Rolfe (2005). **The Physiology of Flowering Plants**. 4th Edition. Cambridge university press. (from the internet)
- 4- Jan, V. K. (2009). Fundamentals of Plant Physiology, 11th Edition. S.Chand and Company Ltd. New Delhi.
- 5- Taiz, L, E. Zeiger, I. M. Moller and A. Murphy (2015). **Plant physiology and development**. 6th Edition. . Senauer Assoc- iates, Inc. Publisher. USA.
- 6- Some internet sites which were related with the objects.

For practical part:

- 1- Witman, Francis H., David F. Blaydes & Robert M. Devlin (1971), Experiments in plant physiology, VAN NOSTRAND REINHOLD COMPANY.
 - 2- Internet websites: using the following key words:
 - 3- Practical plant physiology
 - 4- Laboratory experiments of plant physiology
 - 5- Or any key words for each private subject.
- (6) - السعدي, حسين علي و عبدالله حمد الموسوي (1980), فسلجة النبات العملي, مطبعة جامعة البصرة
- (7) - عبدول, كريم صالح و فؤاد منحر علكم (1988), فسلجة النبات العملي, جامعة صلاح الدين/ كلية التربية

17. The Topics:	Lecturer's name
<p><u>Week 1:</u> (2 hrs)</p> <ul style="list-style-type: none"> -History of plant physiology -Introduction and definitions 	<p>Lecturer's name: Prof. Dr. Sawsan M-Saeed (2 hrs)</p>
<p><u>Week 2:</u> (2 hrs)</p> <ul style="list-style-type: none"> -Plant cell -Plant specific organelles -Cell wall -The protoplast components and their functions 	
<p><u>Week 3:</u> (2 hrs)</p> <ul style="list-style-type: none"> -Water in plant life - The importance of the water for plants -The structure and properties of water -Kinetic theory -Diffusion 	
<p><u>Week 4:</u> (2 hrs)</p>	

<p>-Osmosis -Membranes and permeability -Water movement and energy -Turgor pressure -Importance of turgidity</p> <hr/> <p>Week 5 and 6: (4 hrs) -Osmotic pressure -Plasmolysis -Imbibitions or hydrolysis -Absorption of water: - Factors affecting on the water absorption</p> <hr/> <p>Week 7: (2 hrs) Translocation of water through the plant - Root pressure -Vital theories -Cohesion-tension theory -Transpiration - The stomata mechanism</p> <hr/> <p>Week 8 and 9: (4 hrs) Photosynthesis -Light absorption -Antenna system -Photosynthesis apparatus - Photosynthetic reactions - Photosystem electron transport - Carbon reactions (of C3, C4 and CAM plants) - Differences between C3 and C4 plants - Factors that affecting photosynthesis</p> <hr/> <p>Week 10: (2 hrs) Carbon reactions (of C3, C4 and CAM plants) - Differences between C3 and C4 plants - Factors that affecting photosynthesis</p> <hr/> <p>Week 11: (2 hrs) Mineral nutrients of plants - Nutrient uptake - What elements must a plant absorb to live and grow? - take of mineral nutrients by plants</p> <hr/> <p>Week 12: (2 hrs) Translocation of Organic Compounds -The structure of the phloem -The composition of phloem sieve tube sap -Mechanisms of phloem transport</p>	<p>Lecturer's name: Dr. Media E. MohammedAmin (2 hrs)</p>
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- Week 13: (2 hrs)
- Plant Metabolism
- Anabolism
- Catabolism
- Primary Metabolism
- Secondary Metabolism

Week 14: (2 hrs)

- Resistance to Stress
- Water deficient stress
- Low temperature stress
- High temperature stress

Week 15: (2 hrs)

Growth and development

- The measurement of plant growth
- Growth, development and differentiation

19. Examinations: (theoretical part)

1-Fill in the blanks,

-There are three types of transpiration:

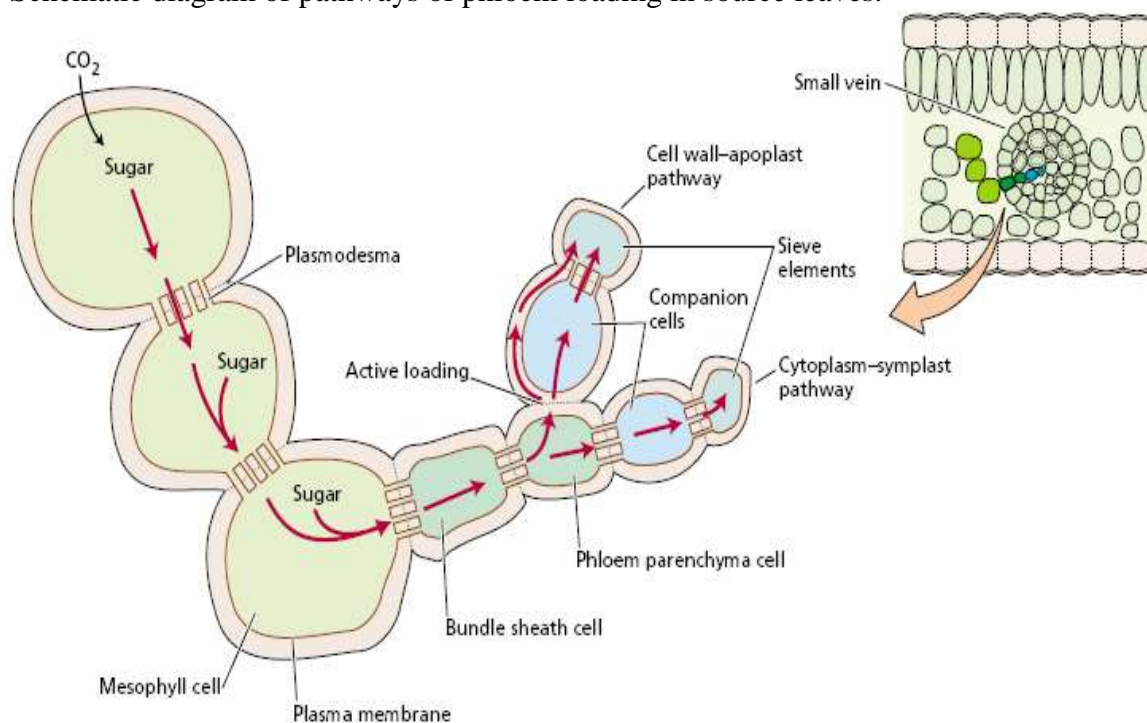
a- stomatal transpiration.

b- lenticular transpiration.

c- cuticular transpiration.

2- Explain the following by schemes or diagrams:

*Schematic diagram of pathways of phloem loading in source leaves.



3-(Short compositional answer)

* Explain kinetic theory.

-*Kinetic theory*

The elementary particles (atoms, ions and molecules) are in constant motion at temperature above absolute zero. The average energy of a particle of homogeneous substance rises as temperature increases.

Velocities can be calculated for particles in gases (its more difficult in liquids and solids) by:

$$V_{ave} = (8RT/JM)^{1/2}$$

Where:

Vave= average velocity in centimeters/ seconds (cm S-1)

R= molar gas constant (8.31*10⁷)

T= absolute temperature in Kelvin

M= molecular weight in grams/moles

Jl=3.14

4- Enumerate the following:

* The importance of the water for plants:

1-The water is the main part of the cytoplasm.

2-The water is the media for biochemical reactions in the cell.

3-The water is transferring minerals and materials in the plant.

4- The water maintains the turgid pressure of the cells.

5-Some gases like O₂ and CO₂ are dissolved in the water.

5- Multiple choices:

* The process of water evaporation from the plants called-----.

(1)Photosynthesis, 2) transpiration, 3) translocation)

6-Give the reason for the following phrases:

* Why water molecules are attracted to other substances?

- Water molecules are attracted to other substances because of its polar nature, water is attracted to many other substances (e.g. cell wall polysaccharide) this is called adhesion.

7- Correct the underlined parts if they are false:

* The high Latent heat of water causes stability of the temperature. X

- The high specific heat

20. Extra notes:

21. Peer review پېداچوونډه ځای څارول

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