Department of Biology

College of Education

University of Salahaddin- Erbil

Subject: Plant Physiology

Course Book – Year 4

Lecturer's name: Prof.Dr Mohammed Qader Khursheed

Academic Year: First Semester 2023 / 2024

Course Book

1. Course name	Plant physiology- 1st Semester
2. Lecturer in charge	Prof.Dr. Mohammed Qader Khursheed
3. Department/ College	Biology/Education
4. Contact	e-mail: mohammed.khursheed@su.edu.krd
5. Time (in hours) per week	Theory: 2 for each 2 group
6. Office hours	Wednesday: 8.30- 10.30am, 10.30--12.30pm
7. Course code	EdB0403
8. Teacher's academic profile	I was awarded M.Sc. in 1996 and PHD in 2004 in the field of Plant Physiology from Dept. of Biology, College of Education, University of Salahaddin - Erbil, Iraq. Plant Physiology, Plant Anatomy, Biostatistics and Stress Physiology are my interest area of expertise. **The researches published that are:** 1- Biochemical changes during rooting period in olive (*Olea europaea* L. CV. Ashrasi) cuttings following IBA application. The scientific journal of Duhok University, 8(1) 2005. 2- Effect of some nutrients on rooting ability of olive (*Olea europaea* L. CV. Ashrasi) cuttings. The scientific journal of Duhok University, 8(1) 2005. 3- The effect of salt stress on leaf water relations, growth and yield in wheat varieties. J. of Babylon Univ., 10(3) 2005. 4- Effect of Some Growth Retardant on Rooting Ability and Shoot Growth of Olive (*Olea europaea* L. CV. Ashrasi) Cuttings. The journal of Ibin-Haitham, journal for Pure and Applied Sciences, Baghdad University Education Ibin-Haitham College, 19(4A) 2006. 5- Effect of foliar application of zinc on growth, yield and some chemical constituents of faba bean *(Vicia faba* L. sham local cv.) plants. The scientific journal of Duhok University, 10(2) 2007. 6- Effect of Different Auxins and Type of Cuttings on Rooting Ability of Orange *(Citrus sinensis* L. Local Cv.) Cuttings. The scientific journal of Salahaddin Univ., Zanco, 19 (2) 2007. 7- Effect of different auxins and application's methods on rooting ability of olive *(Olea europaea* L. CV. ashrasi) semi-hardwood cuttings. The scientific journal of Duhok University, 10(2) 2007. 8- Effect of foliar application of Salicylic acid on growth, yield components and chemical constituents of Wheat (*Triticum aestivum* L. var. Cham 6). 5th Scientific Conference of College of Agriculture -Tikrit University from 26 to 27 April 2011, special issue. 9- Effect of Mepiquat Chloride on Growth of Wheat (*Triticum aestivum* L. var. Cham 3) under Water Stress Conditions. The scientific journal of Salahaddin Univ., Zanco 23 (1) 2010.. 10- Effect of salicylic acid on some biomass and biochemical changes of

	drought- stressed wheat (*Triticum aestivum* L var. cham 6) seedlings. The scientific journal of Duhok University, 13 (2) 2010. 11- Effect of Foliar Application of Ascorbic acid on Mineral and Biochemical Constituents of Wheat Grown under Salt Stress Conditions. The scientific journal of Duhok Univer., 15(2):36-44, 2012. 12- Effect of Foliar Application of Ascorbic acid on Growth, Yield Components and Some Chemical Constituents of Wheat. The scientific journal of Salahaddin Univ.,Zanco 24(1) 2012. 13- Effect of Foliar Application of Ascorbic acid on Growth, Yield Components and Some Chemical Constituents of Wheat under Water Stress Conditions (Jordon J of agriculture science- 10(1) march 2014. 14- Effect of Salicylic Acid on Shoot and Root Biomass, Some Ionic and Biochemical Changes in Wheat-accepted in 4TH International Conference and Workshops on Basic and Applied Sciences, Malaysia from 3rd to 5th September 2013,Abst.pp.69 15- Response of Barley (*Hordeum vulgare* L.) Plants to Foliar Fertilizer with Different Concentrations of Hoagland Solution. Raphidain Sciences J. (392), 8/4/2014. 16- Effects of Saline Water on Shoot and Nutrient Accumulation of Four Wheat Cultivars. . Raphidain Sciences J. (390), 8/4/2014. 17- Effect of Different Nitrogen Fertilizers on Growth and Yield of Wheat. Zanco Journal of Pure and Applied Sciences Vol.27, No.5,2015. 18- Effect of Soaking Seeds in the Plant Growth Regulator Solutions on Growth of Wheat (*Triticum aestivum* L.). The scientific journal of Koea Univ. ARO, Volume IV No. 1, 2016. 19- Effect of Different Drought Stress Levels on Morphological, Growth and Yield of Six Bread Wheat (*Triticum aestivum L.*) Cultivars.The official scientific journal of Salahaddin University-Erbil ZJPAS (2016), 28 (3); 37-48 20- In vitro culture characters of some Bread wheat genotypes under Drought stress condition Journal of Agricultural Faculty of Uludag University, 2016,Volume: 30, Number: Special Issue, 11-16. 21- Drought Tolerance and Genetic Diversity among Selected Wheat Cultivars. The official scientific journal of Salahaddin University-Erbil ZJPAS (2017). 22- Effect of Different Concentrations of IBA on Rooting Ability and Shooting in Olive (*Olea europaea* L., cv. Dgel) Cuttings. International Conference and Workshop on Basic and Applied Sciences 2017. March 18th-19th 2017, Erbil-KRG-IRAQ. 23- Abscisic acid accumulation and physiological indices in responses to drought stress in wheat genotypes. The Iraqi Journal for Agricultural Sciences, 2019, 50(2):705-712 24. Synergistic effects of rhizobial inoculum with chemical fertilizer on growth and yield of wheat. APPLIED ECOLOGY AND ENVIRONMENTAL RESEARCH 17(4):10119-10138 25. Improvement of wheat quality and soil fertility by integrates chemical fertilizer with rhizobial bacteria. The official scientific journal of

Salahaddin University-Erbil ZJPAS. 124(26/11/2019)

26- Effect of Foliar Application with Yeast Extract and Methanol on Morphological and Yield characteristics of Faba bean (*Vicia faba* L.)" by Maqsuda Qader Muhammad , Mohammed Qader Khursheed and Nihayat Hamadamin Hasan. *Plant Archives,* Vol. 20 No.2 October, 2020.

27. Hypolipidemic Efficacy of Omega-3 Fatty Acids in Comparison with Rosuvastatin in Induced

Hyperlipidemic Albino Rats. Shahrokh Mojarrad, Nadir Mustafa Qadir Nanakali, Mohammed Q. Khursheed. International Journal of Pharmaceutical and Phytopharmacological Research (eIJPPR) | October 2020 | Volume 10| Issue 5| Page 170-178

28- Some Biochemical and Biomass Responses of Wheat [*Triticum aestivum* L.] to Suboptimal Water Supply and Different Potassium Rates. Shno Y. Hussian and Mohammed Q.khursheed. Kofa J. acceptance.

29- Response of Durum Wheat (*Triticum durum* L.) Genotypes to Drought Stress at Early Growth Stage. Sirwa Anwar Qadir, Maqsuda Qadir Muhammad and Mohammed Qader Khursheed. Qadsia Univer. J acceptance.

30- Response of Durum Wheat (*Triticum durum* L.) Genotypes to salanity at Early Growth Stage. Maqsuda Qadir Muhammad , Mohammed Qader Khursheed and Sirwa Anwar Qadir. Zanco J acceptance.

Teaching:-

Undergraduate: Plant Physiology, Plant Anatomy, Biostatistics

Postgraduate: Adv. Plant Physiology, Plant Growth Regulators, Adv. Plant Anatomy, Soil-Water-Plant Relation, Stress Plant Physiology

The thesis that are supervised by me:

1- Effects of Salicylic Acid on Growth and Chemical Constituents of Wheat (*Triticum aestivum* L. var. Cham 6) under stress conditions (Miss Fakhrya M. Karim, 2009). M.Sc.

2- Wheat (*Triticum aestivum* L.) Response to Ascorbic Acid under Normal and Abnormal Conditions (Miss Zhwan Hussain Khalid, 2010). M.Sc.

3- Effect of Drought and Mepiquat Chloride on growth of Two Wheat (*Triticum aestivum* L.) Cultivars (Miss Zhala Muhamad Amin, 2011). M.Sc.

4- Effect of *Rhizobium* Bacteria on Growth of Maize (*Zea mays* L.) (Miss Salwa Hussian Kamel, 2014). M.Sc.

5- Morphological, Biochemical and Physiological Indices for Drought Tolerance in Wheat Cultivars (Miss Sirwa Anwar Qadir). PhD. Split site.

6- Effect of different factores on Rooting Ability of *olive* (*Olea europaea* L. cv. Dgle) cuttings (Miss Banaz Abdullah Hassan. 2015).M.Sc.

7-Hypolipidemic efficacy of Terminalia arjuna stem bark in comparison with omega-3 and rosuvastatin in hyperlipidemic rats (Shahrokh

	Hossein Raza, 2015). M.Sc. 8-Response of Wheat Cultivars to Inoculation with Rhizobial Bacteria at Various Levels of NPK Fertilization. PhD (Trifa Dhahir Saber, 2019). 9- Effect of Potassium on Drought Tolerance of Wheat Hawler 2 Genotype (Shno Yahya Hussein, 2023). M.Sc. 10- Remediation of Petroleum-Contaminated Soil and water by plants and algal extract as a Nanoparticle Product and assessment of the variability using molecular techniques (Rebwar khdir Shekha, 2023) PhD. **Scientific conferences and training courses in which I participated are:** 1- Teaching Method training 1997. 2- Computer training 1998. 3-Higher Education Conference in Kurdistan region, Erbil, Iraq. 2006. 4-International Conference on Higher Education in Iraq. Kurdistan region, Erbil, Iraq. 2007. 5- Open Education or Far Education Conference in Jordan. Amman. 2007 6- International Conference on Revitalizing Research in Kurdistan, Erbil, Iraq. 2011. 7- 5th Scientific Conference of College of Agriculture -Tikrit University from 26 to 27 April 2011. 8-5th Scientific Conference of Salahadin University- Erbil from 18 to 20 Sept. 2011. 9-The 1st Conference of Graduation researches 28-29 May 2011. 10- The 2nd Conference of Graduation researches 21-22 May 2012. 11- The 3rd Conference of Graduation researches 22-23 May 2013. 12-4TH International Conference and Workshops on Basic and Applied Sciences, Malaysia from 3rd to 5th September 2013. 13-The 4th Conference of Graduation researches 20-21 May 2014 14-The 5th Conference of Graduation researches 12 May 2015. 15- The 6th Conference of Graduation researches May 2016. 16- The 7th Conference of Graduation researches May 2017. 17- The 8th Conference of Graduation researches May 2019. **Scientific positions that are I occupied:** 1. Head of scientific & higher Education affairs of college 1996-1998. 2. Head of Biology Dept. from 2004 to 2009. 3. Head of scientific & higher Education affairs of college from 2009 to March 2020
9. Keywords	Plant physiology, academic profile, Course book

10. Course overview:

Plant physiology is that branch of plant sciences that aims to understand how plants live and function. Its objective is to explain all life processes of plants by a minimal number of comprehensive principles founded in chemistry, physics, and mathematics. Plant physiology studies the ways in which plants absorb minerals and water, grow and develop, flower and bear fruit. It also deals with photosynthesis, respiration, biosynthesis and the accumulation of substances and translocation, which together enable plants to grow and reproduce themselves.

11. Course objective:

1. To learn how plants "work" at cell, tissue, organ and the whole plant level.
2. To develop and enhance skills through a variety writing assignments. This course introduces basic principles of plant function.
3-To gain an understanding of the processes that are important to the normal functioning of plants.

12. Student's obligation

Class attendance is taken on a daily basis. Students are expected to attend all classes. Attendance in each class is counted from the first day the student is eligible to attend the class as given on the student's assessment sheet "admit to class" registration card or student change notice.

13. Forms of teaching

Power point presentation for head titles, summary, definitions, classifications of materials and any other illustrations will be used to reach the objectives of the course. Supplementary reading will be required from books and photocopies reserved in the library.

14. Assessment scheme

Approximately one examination will be given during the course. The exam consist of True or false, fill blanks, multiple choice, schemes, definitions and discussion questions. Any student who misses a scheduled exam without a valid excuse will receive a grade of "0" with no opportunity to make up the exam. The semester grade is based on the exam, the final exam and lab reports. Points are awarded for class attendance. Excessive absences may affect the final grade (see below):

1- one monthly theoretical examination = 12%
2- Attendance = 3%
3- Laboratory examination (2monthly + experiment reports)=35%
4- A comprehensive final examination 50% (theoretical).

15. Student learning outcome:

Each Student will:

- demonstrate understanding the role of water in plant life.
- demonstrate understanding water potential and its uptake and transport and effect on cellular function.
- demonstrate understanding soil plant water relation.
- demonstrate understanding of growth developmental patterns and processes of plants
- demonstrate understanding organelle function at the cellular level of cell.

- demonstrate detailed understanding of the physiological mechanisms of xylem and phloem translocation and materials translocated in xylem and phloem sap.
- demonstrate understanding of the metabolic pathways such as photosynthesis and respiration in energy acquisition and use during plant development.

16. Course Reading List and References:

▪ Key references: Khursheed, M. Q. 2023. *Plant Physiology for 4th Class Biology Students*.

▪Useful references: Taiz, L. and E. Zeiger. 2006. *Plant Physiology, 4th ed*. Sinauer Associates Inc., MA. Available at bookstore or online.

17. The Topics:

Weeks	Topics	Time
1	Introduction & course book	19/9
2	Photosynthesis	26/9
3	Photosynthesis	3/10
4	Respiration	10/10
5	Translocation in the Phloem	21/11
6	Water & Plant relation	28/11
7	Water potential	5/12
8	Monthly examination	--
9	Soil Plant Water relation	12/12

18. Practical Topics (If there is any)

19. Examinations:

1. Compositional:

What is Photorespiration? Why is wasteful reaction?

Answer: In the "normal" reaction, CO2 is joined with RUBP to form 2 molecules of 3PGA. In the process called photorespiration, O2 replaces CO2 in a non-productive, wasteful reaction. Less ATP Is Produced from the Photorespiration The appearance of C4-type plants appears to be an evolutionary mechanism by which photorespiration is suppressed because PEP Carboxylase has a much higher affinity for CO2 than does Rubisco in C3 plants.

2. True or false type of exams:

1-Appoplast involves cytoplasm and plasmodesmata.

2-Pressure decreases speed of molecules, therefore, decrease the rate of diffusion.

3-Aquaporins facilitate the diffusion of water and small neutral solutes across plant cell membranes.

4- A cell in a hypotonic solution will take up water, generating a hydrostatic pressure (turgor pressure) in the cell.

5- Dialysis is specialized case of diffusion; it is the diffusion of solvent across a semi-

permeable membrane.

6-The mole fraction of solvent = # solvent molecules/ total (# solvent molecules + # solute molecules).

Answer: 3, 4 and 6 true and others (1, 2 and 5) false.

1-Symplast involves cytoplasm and plasmodesmata.

2-Pressure increases speed of molecules, therefore, increase the rate of diffusion.

5- Dialysis is specialized case of diffusion; it is the diffusion of solvent across a semi-permeable membrane.

3. Multiple choices:

1-Short-Distance Transport Involves:

a-simple diffusion b-bulk flow c- active transport

2-The light reaction of photosynthesis supply calvin cycle with:

a-light energy b-CO_2 c-H_2O d-NADPH e-sugar f-ATP

Answer: 1(a&c), 2(d&f)

4***. Fill blanks***

1-Between the two leaves epidermis there is---------- which called ---------- tissue.

2- Lateral root originates from the ---------- cells.

Answer: 1- Mesophyll, Chlorenchyma 2- Pericycle

20. Extra notes:

21. Peer review

This template is really excellent and rich because it covered all aspects; he did not leave any space but filled with useful information.

Signature:

Prof. Dr.Abdullah Sh. Sardar/ Biology Dept./College of education