

Ministry of Higher Education and Scientific research



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: Second Semester 2023 / 2024

Course Book

1. Course name	Plant physiology – 2 nd 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	<p>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.</p> <p>The researches published that are:</p> <ol style="list-style-type: none"> 1- Biochemical changes during rooting period in olive (<i>Olea europaea</i> 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 (<i>Olea europaea</i> 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 (<i>Olea europaea</i> 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 (<i>Vicia faba</i> 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 (<i>Citrus sinensis</i> 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 (<i>Olea europaea</i> 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 (<i>Triticum aestivum</i> 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 (<i>Triticum aestivum</i> L. var. Cham 3) under Water Stress Conditions. The scientific journal

	<p>of Salahaddin Univ., Zanco 23 (1) 2010.</p> <p>10- Effect of salicylic acid on some biomass and biochemical changes of drought- stressed wheat (<i>Triticum aestivum</i> L var. cham 6) seedlings. The scientific journal of Duhok University, 13 (2) 2010.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p> <p>15- Response of Barley (<i>Hordeum vulgare</i> L.) Plants to Foliar Fertilizer with Different Concentrations of Hoagland Solution. Raphidain Sciences J. (392), 8/4/2014.</p> <p>16- Effects of Saline Water on Shoot and Nutrient Accumulation of Four Wheat Cultivars. . Raphidain Sciences J. (390), 8/4/2014.</p> <p>17- Effect of Different Nitrogen Fertilizers on Growth and Yield of Wheat. Zanco Journal of Pure and Applied Sciences Vol.27, No.5, 2015.</p> <p>18- The Plant Regulator Soaking Seeds and its Reflections on Growth and Yield Quality of Wheat. The scientific journal of Koea Univ. ARO, Volume IV No. 1, 2016.</p> <p>19- Effect of Different Drought Stress Levels on Morphological, Growth and Yield of Six Bread Wheat (<i>Triticum aestivum</i> L.) Cultivars. The official scientific journal of Salahaddin University-Erbil ZJPAS (2016), 28 (3); 37-48.</p> <p>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.</p> <p>21- Drought Tolerance and Genetic Diversity among Selected Wheat Cultivars. The official scientific journal of Salahaddin University-Erbil ZJPAS (2017).</p> <p>22- Effect of Different Concentrations of IBA on Rooting Ability and Shooting in Olive (<i>Olea europaea</i> L., cv. Dgel) Cuttings. International Conference and Workshop on Basic and Applied Sciences 2017. March 18th-19th 2017, Erbil-KRG-IRAQ.</p>
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	<p>23-Synergistic effects of rhizobial inoculum with chemical fertilizer on growth and yield of wheat. APPLIED ECOLOGY AND ENVIRONMENTAL RESEARCH 17(4):10119-10138</p> <p>24-Absciscic acid accumulation and physiological indices in responses to drought stress in wheat genotypes. The Iraqi Journal for Agricultural Sciences, 2019, 50(2):705-712</p> <p>25- Improvement of wheat quality and soil fertility by integrates chemical fertilizer with rhizobial bacteria. The official scientific journal of Salahaddin University-Erbil ZJPAS (2020), 32(2); 178-191.</p> <p>26-Effect of Foliar Application with Yeast Extract and Methanol on Morphological and Yield characteristics of Faba bean (<i>Vicia faba</i> L.). Plant Archives (<i>International Journal of Plant Research</i>) Vol. 20 No.2 October 2020.</p> <p>27- Hypolipidemic Efficacy of Omega-3 Fatty Acids in Comparison with Rosuvastatin in Induced Hyperlipidemic <i>Albino Rats</i>” published in international journal of pharmaceutical and phytopharmacological research. 10(5); 170-178, 2020.</p> <p>Teaching:-</p> <p>Undergraduate: Plant Physiology, Plant Anatomy, Biostatistics Postgraduate: Adv. Plant Physiology, Plant Growth Regulators, Adv. Plant Anatomy, Soil-Water-Plant Relation, Stress Plant Physiology</p> <p>The thesis that are supervised by me:</p> <p>1- Effects of Salicylic Acid on Growth and Chemical Constituents of Wheat (<i>Triticum aestivum</i> L. var. Cham 6) under stress conditions (Miss Fakhrya M. Karim, 2009). M.Sc.</p> <p>2- Wheat (<i>Triticum aestivum</i> L.) Response to Ascorbic Acid under Normal and Abnormal Conditions (Miss Zhwan Hussain Khalid, 2010). M.Sc.</p> <p>3- Effect of Drought and Mepiquat Chloride on growth of Two Wheat (<i>Triticum aestivum</i> L.) Cultivars (Miss Zhala Muhamad Amin, 2011). M.Sc.</p> <p>4- Effect of <i>Rhizobium</i> Bacteria on Growth of Maize (<i>Zea mays</i> L.) (Miss Salwa Hussian Kamel, 2014). M.Sc.</p> <p>5- Morphological, Biochemical and Physiological Indices for Drought Tolerance in Wheat Cultivars (Miss Sirwa Anwar Qadir). PhD. Split site.</p> <p>6- Effect of different factors on Rooting Ability of <i>olive</i> (<i>Olea europaea</i> L. cv. Dgle) cuttings (Miss Banaz Abdullah Hassan. 2015).M.Sc.</p> <p>7-Hypolipidemic efficacy of Terminalia arjuna stem bark in comparison with omega-3 and rosuvastatin in hyperlipidemic rats (Shahrokh</p>
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	<p>Hossein Raza, 2015). M.Sc.</p> <p>8-Response of Wheat Cultivars to Inoculation with Rhizobial Bacteria at Various Levels of NPK Fertilization. PhD (Trifa Dhahir Saber, 2019).</p> <p>9- Effect of Potassium on Drought Tolerance of Wheat Hawler 2 Genotype (Shno Yahya Hussein, 2023). M.Sc.</p> <p>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.</p> <p>Scientific conferences and training courses in which I participated are:</p> <p>1- Teaching Method training 1997.</p> <p>2- Computer training 1998.</p> <p>3-Higher Education Conference in Kurdistan region, Erbil, Iraq. 2006.</p> <p>4-International Conference on Higher Education in Iraq. Kurdistan region, Erbil, Iraq. 2007.</p> <p>5- Open Education or Far Education Conference in Jordan. Amman. 2007</p> <p>6- International Conference on Revitalizing Research in Kurdistan, Erbil, Iraq. 2011.</p> <p>7- 5th Scientific Conference of College of Agriculture -Tikrit University from 26 to 27 April 2011.</p> <p>8-5th Scientific Conference of Salahadin University- Erbil from 18 to 20 Sept. 2011.</p> <p>9-The 1st Conference of Graduation researches 28-29 May 2011.</p> <p>10- The 2nd Conference of Graduation researches 21-22 May 2012.</p> <p>11- The 3rd Conference of Graduation researches 22-23 May 2013.</p> <p>12-4TH International Conference and Workshops on Basic and Applied Sciences, Malaysia from 3rd to 5th September 2013.</p> <p>13-The 4th Conference of Graduation researches 20-21 May 2014</p> <p>14-The 5th Conference of Graduation researches 12 May 2015.</p> <p>15- The 6th Conference of Graduation researches May 2016.</p> <p>16- The 7th Conference of Graduation researches May 2017.</p> <p>17- The 8th Conference of Graduation researches May 2019.</p> <p>Scientific positions that are I occupied:</p> <ol style="list-style-type: none"> 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. Subjects studied in this course included plant growth regulators, phytochromes, flowering in plants, plant movements and plant nutritious.

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 2unit examinations will be given during the course. Each exam will 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 score of one-lecture exams, 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 examinations = 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 of the major effects and physiological mechanisms of growth regulators (hormones) in plants.
- demonstrate detailed understanding of the physiological mechanisms involved in the flowering and how plants response to light duration.
- demonstrate detailed understanding of the plant movements
- demonstrate understanding of the mechanisms for procurement of mineral ions by plants, mineral nutrition, and the role these minerals play in organic molecule synthesis and use.

16. Course Reading List and References:

- Key references: Khursheed, M. Q. 2022. *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	18/1
2	Plant growth and development	25/1
3	Plant Growth Regulators	1/2
4	Cytokinins and Gibberellins	8/2
5	Abscisic Acid and Ethylene	15/2
6	Phytochrome	22/2
7	Plant Flowering	1/3
8	Movement in plant	29/3
9	Monthly Examination	5/4
10	Mineral Nutrition	12/4

18. Practical Topics (If there is any)

19. Examinations:

1. Compositional:

How Gas induce of seed germination and control dormancy?

Answer: GAs can cause seed germination in some seeds that normally require cold (stratification) or light to induce germination. The release of gibberellins from embryo signals seeds to break dormancy and germinate: i) Imbibition stimulates gibberellin release ii) Environmental cues also cause gibberellin release in seeds iii) Stimulate germination and support growth by stimulating synthesis of mRNA which codes for α -amylase iv) Act antagonistically with abscisic acid, which inhibits plant

2. True or false type of exams:

- 1- The flowering signal is grafting transmittable.
- 2- Short-day plants need low Pr.
- 3- Nitrifying bacteria like *Nitrosomonas* converts nitrate to nitrate.
- 4- At sunset, most of the phytochrome is in the Pr form, during the night, Pfr is converted back into Pr or breaks down.

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

2- Long-day plants need low Pr.

3- Nitrifying bacteria like *Nitrosomonas* converts ammonia to nitrate.

3. Multiple choices:

1- Pr is synthesized in the dark in cytosol by the plant:

- a- Chloroplast b- Nucleus c- Both

2- The main part sensitive to low temperature is:

a-leaves

b-shoot apical meristem

Answer: 1(c), 2(b)

4. Fill blanks

1-The ----- is the precursor of ethylene.

2- Without ----- stem parenchyma cell grows very large and does not divide.

Answer: 1- Methionine 2-CKs

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