COURSE BOOK

Department of Horticulture

College of Agricultural Engineering Sciences

University: Salahaddin University

Subject: Plant Growth Regulators

Course book: Third Stage

Lecturers name: Dilzar Basit Zrar

Academic Year: 2023-2024

Course book

Course name	**Plant growth regulators /Autumn semester**
Lecturer in charge	**Dilzar Basit Zrar**
Department/Faculty	**Horticulture/Agricultural Engineering Science**
Contact	**e-mail: dilzar.zrar@su.edu.krd**
Time per week	**Practical:3 hours**
Office hours	
Course code	
Teachers academic profile	**Dilzar Basit Zrar:** I have got my B.Sc. at salahaddin University – Agricultural engineering science college – Forestry and Horticulture department in 2012; I have got M.Sc. at Salahaddin University – Agricultural engineering science college –Horticulture department in 2017. Nowadays I am working as Lecturer in Department Horticulture-Agricultural engineering science College. **With my believes: should be** • The students are encouraged to attend all the lectures and keep good notes of every topic discussed in class. • Participation the student in all lecture, laboratory and field trip activities and discussions.
Key words	**Hormones, Gibberellins, Tropism, Bolting.**
Overview	Plant hormones are not nutrients, but chemicals that in small amounts promote and influence the growth, development, and differentiation of cells and tissues. The biosynthesis of plant hormones within plant tissues is often diffuse and not always localized. Plant growth regulators, their chemical and physical properties; general principles, practices and applications in regulating plant growth and development.
Course objective	**This course was designed to:** • Provide the student with the principle knowledge of some physiological effects of plant hormones inside the plant.

	▸ Students will understand the historical aspects and fundamental terms/concepts for plant growth substances including: auxins, gibberellins, cytokinins, abscisic acid, and ethylene. ▸ Students will understand the role of PGRs as a tool to improve the production quality of many perishable ornamentals, including cut flowers and foliage, flowering potted plants and increasing production and size some of fruit crops. ▸ Provide the student with the knowledge about the preparation of plant hormone solution.
Students obligation	**He/she must:** Attendance in all lectures. Keep in mind, however, that exam questions come from lectures and class discussions. Completion in Quiz every week and examination. do and perpetrate reports
Forms of teaching	**Using of**: White board, Data shows to present the picture, videos and PowerPoint. With the small practice works in the Lab .
Assessment scheme	Practical have 35 Marks. **Monthly**: Divide the 35 Marks as following. First Exam: 15 Marks Second exam: 15 Marks Weekly quizzes: 5 Marks
Student learning outcome	**Upon the participation of this course, the students should able to:** ▸ Recognize the type of plant hormones and their function. ▸ Gain the efficient knowledge about the preparation of plant hormones and select the best external application methods.

	▸ At the end of course, Students will able to use the plant hormones in a trade range for plant propagation.
Course Reading list and reference	المصادر الرئيسية والمتوفرة في مكتبة الكلية : **1) أبوزيد ، الشحات نصر (2000)** . الهرمونات النباتية والتطبيقات الزراعية . الطبعة الثالثة – الدار العربية للنشر والتوزيع – القاهرة . **2) صالح ، مصلح محمد سعيد (1990)** . فسيولوجيا منظمات النمو النباتية – الطبعة الاولى . دار الحكمة للطباعة والنشر . **3) عبدول ، كريم صالح (1987)** . منظمات النمو النباتية . الجزء الثاني ، الطبعة الاولى – وزارة التعليم العالي والبحث العلمي – مديرية دار الكتب للطباعة والنشر . **4) عبدول ، كريم صالح (1987)** . منظمات النمو النباتية . الجزء الأول ، الطبعة الاولى – وزارة التعليم العالي والبحث العلمي – مديرية دار الكتب للطباعة والنشر . **5) عبدول ، كريم صالح ومصلح محمد سعيد (1983)** . إستخدام منظمات النمو في البستنة . مديرية مطبعة الجامعة – جامعة الموصل . **(6)Mukherji S . (2009).** Plant Physiology . New central Book Agency (P) Ltd . **(7) Verma V. (2007) .** Plant Physiology . Ane Books india . **(8) Taiz Zeiger (1998)** . Plant Physiology . Sinauer Associates , Inc. http://www.alanwood.net/pesticides/class_plant_growth_regulators.html http://www.springer.com/life+sciences/plant+sciences/journal/344 http://agropedia.iitk.ac.in/?q=content/pgr-vegetable-production

- **Abeles FB :** Ethylene in Plant Biology. Academic Press, Inc., New York. 1973.
- **Addicott FT (editor):** Abscisic Acid. Praeger, New York. 1983.
- **Addicot FT, Smith OE, Lyon JL :** Some physiological properties of abscisin II. Plant Physiol. 40 : Supple. XXVI, 1965.
- **Taiz L and Zeiger E**. Plant Physiology. 3rd edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts PP. 690. (2002)
- **Brian PW :** The Gibberellins as hormones. Int. Rev. Cytol. 19 : 229-266, 1966.
- **Carr DJ :** Plant Growth Substances. Springer-Verlag. 1972.
- **Chrispeels MJ, Varner JE :** Hormonal control of enzyme synthesis— On the mode of action of gibberellic acid and abscisin in aleurone layers of barley. Plant Physiol. 42 : 1008, 1967.

	PracticaTopics
Week 1	What are Plant growth regulators, kinds of Plant growth regulators, Methods of using growth regulators?
Week 2	Methods of preparing plant growth regulators solutions. What is a bioassay? Practice part: sowing seeds of some plants, to produce seedlings for Auxin experiments.
Week 3	Auxins, Some Auxin bioassays.
Week 4	Experiments that expression of Auxins effects on the plants in the labor and green house, e g. Apical dominance (using the seedlings of 2nd week)
Week 5	Gibberellin, Bioassays of Gibberellin, Transport of Gibberellin.
Week 6	1-Experiments expression of Gibberellin effects on the plants in the labor and green house, e g. seed germination.(using the seedlings of 2nd week) 2 -taking parameters of 4th week experiment.
Week 7	Examination
Week 8	Cytokinins, Cytokinins bioassays.
Week 9	Experiments expression of Cytokinins effects on the plants in the labor and green house.
Week 10	Ethylene, Ethylene bioassay. Plant growth inhibitors, Abscesic acid bioassay.
Week 11	Plant growth inhibitors, Abscesic acid bioassay.

Week 12	Plant growth retardants, Cycocel (CCC), Cycocel Bioassay, Alar and their effects on the plants.Experiments expression of Plant growth inhibitors and retardants effects on the plants in the labor and green house.
Week 13	Experiments expression of Plant growth inhibitors and retardants.
Week 14	Examination.

Examinations: (Practical part)

Define terms:

Q\ Plant hormone:

Plant hormones are chemical messengers that affect a plant's ability to respond to its environment. Hormones are organic compounds that are effective at very low concentration; they are usually synthesized in one part of the plant and are transported to another location.

Q\Write the Methods of using Plant Growth Regulators:

1- Sprays 2- Soaking 3-Liner dips 4-Drenches 5- Injections

Q\ write about the following tests:

1- Avena Coleoptile Section Test:

The Avena coleoptile section test is based only on the ability of auxin to stimulate cell elongation. Transport of auxin or differential growth caused by auxin are not involved here. This test, utilizing sections of the oat coleoptile, was first used by Bonner in 1933, and this test unlike the Avena coleoptile curvature test, measures the effect of growth regulators over a wide range of concentrations.

2- Dwarf seedling:

One of the pronounced effects of gibberellins is promotion of stem elongation. When applied to dwarf plants, gibberellins will induce stem elongation and the plant will become tall. So they break dwarfism and induce the elongation of dwarf plant. Dwarfism often results from a plants inability to make active forms of gibberellic acid, thus the exogenous application of GA is thought to correct endogenous deficiency of this hormone.