

Ministry of Higher Education and Scientific research



University of Salahaddin

College of Agricultural Engineering Sciences

Department of Horticulture

Subject: Plant Physiology

Course Book – 3rd Year

Lecturer's name: Asst. Lec. Dilzar Basit Zrar

Academic Year: 2023/2024

Course Book

1. Course name	First Semester / Plant Physiology
2. Lecturer in charge	Assist. Lec. Dilzar Basit zrar
3. Department/ College	Horticulture / Agricultural Engineering Sciences
4. Contact	e-mail: dilzar.zrar@su.edu.krd
5. Time (in hours) per week	Theory: 2 Practical: 3
6. Office hours	Sunday until Thursday
7. Course code	
8. Teacher's academic profile	I have finished my B.Sc. in salahaddin University – Agriculture college – Horticulture Department 2012; I have got M.Sc. in Salahaddin University – Agriculture college –Horticulture department 2017. Nowadays I am working as Lecturer in Department Horticulture- Agricultural engineering sciences College.
9. Keywords	
10. Course overview:	Preparing and carrying out experiments in plant physiology as in studying the physiological reaction in the cell, like diffusion, imbibition, permeability, osmosis, transpiration, solution and Preparation of Solutions and concentration; photosynthesis; experiments that show the effects of these phenomena's in the plant.
11. Course objective:	<p>This course aims to acquire the student the practical skills which is related to the theoretical part of the plant physiology course, in which aims to:</p> <ul style="list-style-type: none"> • 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: <ol style="list-style-type: none"> 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	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

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

14. Assessment scheme

Grading: This subject includes practical part

practical part	First exam	Second exam	Quiz, activity and report	Total
degree	15	15	5	35

15. Student learning outcome:

The students will be exposed to the Plant physiology and their benefits and the relationship with the forest and horticulture, now they are adapted with the environment and their movement for survival and protection from.

16. Course Reading List and References:

- 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), فلسفة النبات العملي, مطبعة جامعة البصرة

(7) – عبدول, كريم صالح و فؤاد منحر علكم (1988), فلسفة النبات العملي, جامعة صلاح الدين/ كلية التربية

17. The Topics:

18. Practical Topics (If there is any)

1- Solutions

(1) Types of solutions.

(2): Experiments to show Preparation of types of solutions.

- True solution.
- Colloid solution.
- Suspension solution.

2- Colloidal system:

- (1) Classification of Colloids.
- (2) Properties of colloids.
- (3) Experiments to show properties of colloids.

3- Preparation of Solutions (Molarity, Molality and Normality)

Home work: Some questions calculations about preparation of solution.

Examination paper 1 (pending confirmation)

4- Percentage concentration (%) & Part per million solution (ppm)

Home work: Some questions calculations.

5- Diffusion

Experiments to show:

- (1) Diffusion of gases
- (2) diffusion of solid particles in liquids

Imbibition

about:

- 1- the change of weight and volume after imbibition
- 2- the production of thermal energy during imbibition

Examination paper 2 (pending confirmation)

6- Permeability

- Experiment shows the effect of temperature, pH, salt solutions, and poisonous and toxic substances on the permeability of red beet protoplasmic membrane.

7- Osmosis

Experiment about:

- (1) Observation the Osmotic potential of a plant cell using tissue weight.
- (2) Clarify Osmosis (by using potato tubers)
- (3) Determination the water potential due to the stem bending or curvature.

8- Transpiration

Experiment about:

1. Potometer method for determining the diffusion rate:
2. Cobalt chloride paper method for observing the transpiration phenomenon:
3. Comparing the rate of stomatal and cuticular transpiration by four leaves method:

9- Photosynthesis

- (1) Methods of measuring the rate of photosynthesis.
- (2): Experiments to show factors affecting Photosynthesis
 - The effect of light
 - The effect of carbon dioxide

Chlorophyll and accessory pigments:

Determination the amount of chlorophyll a, b and total, using spectrophotometer.

Examination paper 3 (pending confirmation)

19. Examinations:

Q1/ Write the difference between True solutions and colloidal solutions.

Answer:

Property	True solutions	Colloidal solutions
Particle size	Less than 10^{-7} cm	Between 10^{-7} cm and 10^{-5} cm
Visibility of particles	Invisible to naked eye. Not visible under powerful microscope	Invisible to naked eye. Visible under powerful microscope

Sedimentation of particles	Do not settle down	Settle down under high centrifugation
Filtration through filter paper	No residue is formed	No residue is formed

Q2/ Enumerate only, factor effects on Diffusion rate.

Answer:

1. Temperature
2. Size and molecular weight of the particle
3. Concentration Difference
4. Diffusion Distance
5. Surface Area
6. Permeability

Q3/ Write the role of osmosis in plant.

Answer:

1. Absorption of water from the soil by the root hairs and transporting it to the other parts of plant is performed due to osmosis.
2. Support the plant cells to become in a turgid state, that gives the solidity, especially in the regions that the supporting tissues is not formed like the growth apex regions in root and stem.
3. The higher osmotic concentrations, increases the resistance of plants against high degrees of temperature and drought, because it prevents water loss.

4. The opening and closing process of stomata is combined with the osmotic pressure of the guard cells (as the osmotic pressure increased, the guard cell becomes turgid and the stomata will open at day, but it is vice versa at the night).

Q4/ Filling the following gaps:

1- Water potential of the cell (Y)= -----.

Answer: Water potential of the cell (ψ) = $-22.4 * M * N * T/273$

M = molarity.

N= number of ions.

T= 273 + Lab. Temp. (°C).

2- Changed the colour of potato tubers when added NaCl solution (0.8 M) due to-----.

Answer: Osmosis.

3- When a liquid solution completely dissolved in another liquid the two liquid solution called -----.

Answer: miscible

Q5/ How you can extract chlorophyll a & b from plant leaves?

0.5g Of fresh leaves left in 10ml of absolute ethanol for 24 hrs, in dark condition. This process repeated three times for the complete extraction of the chlorophyll, the end volume reached 30ml.

21. Peer review

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