

The Hebrew University of Jerusalem

Syllabus

SOIL FERTILITY AND FERTILIZER USE - 71602

Last update 12-09-2024

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Soil and Water Sciences

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Rehovot

Course/Module Coordinator: Ran Erel

Coordinator Email: ranerel@volcani.agri.gov.il

Coordinator Office Hours: Thu 12:00-13:00

Teaching Staff:

Dr. Ran Erel,
Mr. Gal tzvik

Course/Module description:

The subjects of soil fertility and fertilizers use includes a complex system comprised of apparent distinct components: soil, water, plant, and microorganisms. The course will deal with various aspects of this multicomponent system; the effect of nutrients on the plant; uptake mechanisms; the fate of nutrients in the soil; the influence of different environmental factors on the availability of nutrients; elaborate differences among soil types and between soil and soilless growing media; interactions between distinct components with respect to the plant nutrition, and nutrients availability for plants; fertilizer materials, methods of application and other means to control plant nutrition; we will deal with diagnostics; expand the discussion to aspects of the impact of fertilizer and nutrients on the environment, and discuss best management practices to prevent or minimize surface and ground water pollution.

Course/Module aims:

Gain an understanding of the processes affecting soil nutrients availability for plants. Understand agro-technical tools, especially fertilizers to help the farmer affect crops nutrition. Understanding of the potential impacts on the environment and practices to minimize negative effects.

Learning outcomes - On successful completion of this module, students should be able to:

*Know and understand factors involved in plant nutrition in natural and agricultural ecosystems.
Formulate fertilization scheme. Knowing the terminology of nutrients and fertilizers.
Soil test results' interpretations.*

Attendance requirements(%):

100

Teaching arrangement and method of instruction: Lectures, laboratories, exercises.

Course/Module Content:

1. Introduction: defining the system; main concepts in soil fertility and fertilizers use.

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2. Basic matters: essential nutrients for the plant; processes in the soil; availability to the plant; the rhizosphere - processes and effects on plant nutrition; uptake; response curves.
 3. Essential nutrients: various forms in soils; testing methods; fertilizer types; manures; methods of application; soil and plant reactions.
 4. Essential micronutrients: soil factors inducing stress; uptake mechanisms; chelation.
 5. Interactions between nutrients - chemical and physiological processes.
 6. Problems of nutritional deficiency and excess on Unique environments.
 7. Agrotechnology: fertilizer use, amounts and application methods and their consequences on the environment.
 8. Environmental implications: pollution processes and their prevention; agricultural beneficial use of waste materials.

Required Reading:

None

Additional Reading Material:

1. Barber, S.A. 1995. *Soil Nutrient Bioavailability: A Mechanistic Approach*. 2nd ed. John Wiley and Sons, New York.
2. Bennett, W.F (ed). 1993. *Nutrient Deficiencies and Toxicities in Crop Plants*. APS Press, St. Paul, MN.
3. Burt, C., K. O'Connor, and T. Ruehr. 1998. *Fertigation*. ITRC, California Polytechnic State University, San Luis Obispo, CA.
4. Fageria, N.K., V.C. Baligar, and C.A. Jones. 1997. *Growth and Mineral Nutrition of Field Crops*. Marcel Dekker, New York.
5. Follett R.H., L.S. Murphy, and R.L. Donahue. 1981. *Fertilizers and Soil Amendments*. Prentice-Hall, Englewood Cliffs, NJ.
6. Foth, H.D and B.G. Ellis. 1997. *Soil Fertility*. Lewis Publishers, Boca Raton, Florida.
7. Marschner, H. 1995. *Mineral Nutrition of Higher Plants* (2nd ed). Academic Press, London.
8. Mengel K. and Kirkby E.A. 2001. *Principles of Plant Nutrition* (5th ed). Kluwer Academic Publishers, Dordrecht. 1987 (בספריה קיימות גם , קודמות הוצאות גם , 1982).
9. Reuter, D.J. and J.B. Robinson (eds.). 1986. *Plant Analysis*. Intaka Press, Melbourne.
10. Robinson, J.B.D. (ed). 1983. *Diagnosis of Mineral Disorders in Plants*. Vol. 1: Principles.

H. M. Stationary Office, London.

11. Robinson, J.B.D. (ed). 1983. *Diagnosis of Mineral Disorders in Plants*. Vol. 2: Vegetables.

H. M. Stationary Office, London.

12. Robinson, J.B.D. (ed). 1987. *Diagnosis of Mineral Disorders in Plants*. Vol. 3: Glasshouse. H. M. Stationary Office, London.

13. Tisdale, S.L., W.L. Nelson, J.D. Beaton, and J.L. Havlin. 1993. *Soil Fertility and Fertilizers*. Macmillan Publishing Company, New York.

14. Wallace, T. 1961. *The Diagnosis of Mineral Deficiencies in Plants by Visual Symptoms*.

H. M. Stationary Office, London.

15. אבידן, א., ד. יולס ומ. סנה. 2004. סוגי דשנים וזבלים ואפיונם. משרד החקלאות, שירות הדרכה ומקצוע.

16. רביקוביץ, ש. 1992. קרקעות ישראל, התהוותן, טבען ותכונותיהן. הוצאת הקיבוץ המאוחד.

Grading Scheme:

Written / Oral / Practical Exam 50 %

Essay / Project / Final Assignment / Home Exam / Referat 50 %

Additional information:

If lectures are recorded, attendance requirements in the lectures will be according to the faculty rules. In the laboratory classes and field tour - attendance requirements are 100%.