Institute for Education, Martin Luther King Road, Pembroke PBK 1990. Tel: +35625982001 | Email: ife@ilearn.edu.mt

BAGB102 Soil and Plant Nutrition

ECTS Value: 5 ECTS

Overall Objectives and Outcomes

This module was developed to assist participants to master the skills of logical thinking and scientific questioning. Learners will be introduced to the importance of soil, different growth media and soil less systems and fertilization planning and amendments. This module covers the following important topics, plant nutrition, nutrient dynamics, growth media dynamics as well as the relationship of nutrition to plant physiology.

The module is applicable to participants who wish to increase the knowledge of soil and plant nutrition. They will be required to enquire current issues of population growth, supply of water, supply of food and change in consumer to arable land ratio. This will thus necessitate the development their scientific knowledge about this subject as well as the current and projected populations.

On completion of the module, participants will increase their interest in soil conservation and alternative growth systems. Course participants will have gained knowledge on the limitations of different systems in relation to production objectives and be able to plan and administer a plant nutrition scheme. Thus, learners will have understood the key areas of plant nutrition and growth and apply scientific reasoning to practical investigation.

By the end of this module, the learner will be able to:

Competences

a. diagnose nutrient deficiencies in various organs of a range of plants;
b. critically interpret which method is best suited to assess nutrients in plants and soils in different circumstances;
c. formulate a soil management plan for the improvement and maintenance of soil fertility;
d. investigate the principles of integrated nutrient management systems for maintaining yields and quality;
e. develop plans for balanced inputs and outputs using integrated nutrient management techniques.

Knowledge

a. know how to take a representative soil sample followed by basic soil analysis within a soil science laboratory;
b. describe fertilizer requirements with respect to different crop;

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c. list management techniques are needed for soil protection;
d. describe the biochemical paths of nutrients in plant physiology processes;
e. explain how ions move and interact in the soil;
f. outline the factors that must be considered when designing a fertilizer plan;
g. know how the range of primary and secondary plant nutrients effect plant growth and development;
h. understand how soil characteristics are integral with plant nutrition and productivity;
i. understand how plant nutrient needs differ at different stages of the plant development cycle;
j. understand the effects of positive and negative nutrient balances in soils as a management tool;

Skills

a. carry out the whole process of soil analysis from sampling to interpretation of result;
b. use soil test result to design fertiliser plans;
c. use a range of instruments to monitor a horticultural production process;
d. produce a soil analysis profile to achieve a soil management plan;
e. apply fertilizers for various crops growing in different production systems;
f. prepare a fertilizer plan by using the appropriate software/format;
g. apply integrated nutrient management techniques to enhance production yield;
h. create a nutrient budget to balance inputs and outputs in a nutrient balance system;
i. asses soil chemistry to understand the characteristics of a soil;
j. choose the best fertilizers that should be applied to a crop in a range of agronomic scenarios;
k. decide on the amount of fertilizers that should be applied to a particular crop;
l. analyse the use of Integrated Nutrient Management in meeting productivity needs;
m. understand readings obtained through various soil testing instruments;
n. produce a report;
o. work in a team during sample collection and analysis;
p. debate the best approach to conserve soil and manage nutrients for a given horticultural production;
q. communicate the interpretation of reports and management plans using language that is understandable to local farmers;
r. explain the process of plant nutrient cycling;
s. develop study and research skills needed to manage soil and plant production;
t. write academically;

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u. foster holistic approaches for soil and nutrient management that do not compromise environmental sustainability or production profit;
v. use a range of software to produce nutrient management plans;
w. use word processer software to produce documents suitable for academic presentation;
x. keep records on PC or laptop;
y. use data loggers and process results using the correct software.

Mode of Delivery

This module adopts a blended approach to teaching and learning. Information related to the structure and delivery of the module may be accessed through the IfE Portal. For further details, kindly refer to the Teaching, Learning and Assessment Policy and Procedures found on the Institute for Education's website.

Assessment Methods

This module will be assessed through: Fieldwork, Assignment, and Presentation.

Suggested Readings

Core Reading List

1. B., D., (2002). Resource Management: Soil. Farming Press.
2. G., W., (2008). Introduction to Plant Physiology. Wiley, John & Sons, Incorporated.
3. Magdoff, F., (2004). Soil Organic Matter in Sustainable Agriculture. Taylor & Francis, Inc.
4. Draper, Davi, S, M, (2010). Practical in-Field Assessment and Remediation of Soil Structural Conditions. International Fertilizer Society - Proceeding, [Online]. 677. Available at: http://fertiliser-society.org/Proceedings/US/Prc677.HTM [Accessed 24 January 2018].
5. Lal, R., (2013). Principles of Sustainable Soil Management in Agroecosystems.
6. Havlin, J.R., Tisdale, S.L., Nelson, W.L. and Beaton, J.D. (2004). Soil Fertility and Fertilizers: An Introduction to Nutrient Management. Pearson.
7. Hall. Plant, W., (2010). Western Fertilizer Handbook. Waveland Pr Inc.

Supplementary Reading List

1. C., N., 2009. Elements of the Nature and Properties of Soils. Prentice Hall. BRITISH SOCIETY OF SOIL SCIENCE. European Journal of Soil Science. Oxford: Blackwell Publishing
2. K, U., 2010. Fertiliser Manual Rb209. The Stationery Office/Tso.ATTRA. 2018. Sustainable Soil Management. [ONLINE] Available at: <u>https://www.soilandhealth.org/wp-content/uploads/01aglibrary/010117attrasoilmanual/010117attra.html</u>. [Accessed 30 August 2018]
3. Environment and Resources Authority. 2018. State of the Environment Report. [ONLINE] Available at: <u><a href="https://era.org.mt/en/Pages/State-of-the-Environment-

Report.aspx">https://era.org.mt/en/Pages/State-of-the-Environment-Report.aspx</u>. [Accessed 30 August 2018].
4. Environment and Resources Authority. 2018. Overview of Soil Degradation Threats. [ONLINE] Available at: <u>https://era.org.mt/en/Pages/Overview-of-Soil-Degradation-Threats.aspx</u>. [Accessed 30 August 2018].
5. Environment and Resources Authority. 2018. Soils defined. [ONLINE] Available at: <u>https://era.org.mt/en/Pages/Soils-defined.aspx</u>. [Accessed 30 August 2018].

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