

COURSE TITLE: ADVANCE BOTANY-VI (PLANT NUTRITION & SOIL FERTILITY)

CREDIT HOURS: 3

Syllabus Outline: To study composition of different nutrients, absorption, translocation and assimilation of various nutrients. Nitrogen fixation.

Course Outline:

Introduction, Scope and History of Mineral Plant Nutrition. The Inorganic Components of Plants, Water, Dry Matter, Mineral Competition,

Essential and other Mineral Elements, Macronutrient and Micronutrient Elements, Comparative Macronutrient and Micronutrient Elements; Comparative Elemental Requirements of Higher Plants; Deficiencies and Tissue Analysis, Deficiency Symptoms of Individual Elements. The Media of Plant Nutrition, The Variety of Nutrient Media: Soil; Solution Culture;

Chemical Composition of Nutrient Solutions; Modified Solution Culture, Culture Solutions compared with Soil Solutions.

The Acquisition of Nitrogen Absorption of Nitrate and Ammonium Ions; Nitrogen Fixation, Physiology of Formation of Root Nodules, Physiology of Symbiotic Nitrogen Fixation.

Mineral Metabolism, The Functions of Nutrients, Nutrient Elements as Constituents of Metabolites and Complexes, Nutrient Elements as Activators, Cofactors or Regulators of Enzymes, Nutrient Elements in Physiological Processes. Ecological Aspects of Plant Nutrition, Phenotypic Plasticity, The Concept of the Ecotype, Role of Mineral Elements in Plant Ecology, Interplay between Plants and their Mineral Media. Soil Fertility Evaluation.

Soil and Fertilizer N, P, K, Ca, Mg, S, Fe and Trace Elements. Liming and Use of Gypsum. Fertilizers and Efficient Use of Water.

Module Aims: The students will be able to get an update on issues related to Plant Nutrition and Soil Fertility Integrated on Sustainable Land Use and Natural Resource Management.

Learning Strategies:

1. Lectures
2. Group Discussion
3. Laboratory Work ,
4. Seminar/ Workshop

Learning Outcome: The students will develop an insight into the Mineral Requirements, Media Preparations and Mineral Metabolism. All Agriculture Practices based on fertilization will be analyzed.

Assessment Strategies (Theory) :

The student will be assessed according to the following criteria

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Books Recommended:

1. Taiz, L.D. and Zeiger, E. (2010). Plant Physiology. (5th Ed.), Sierauer Associates.
2. Barker, A.V. and Pilbeam, D.J. (2007). Hand Book of Plant Nutrition. CRC Press Washington D.C.
3. Epstein, E. and Bloom, J.A. (2005) Mineral Nutrition of Plants: Principles and Perspectives. (2nd Ed.), Sierauer Associates.
4. Tisdale, S. and Nelson, W. (2005). Soil Fertility and Fertilizers. (3rd Ed.), Mchillans.
5. Wallace, T. (2005). The Diagnosis of Mineral Deficiencies in Plants. Her Majesty's Stationery Office, London.

TITLE: ADVANCEBOTANY-LAB-VI (PLANT NUTRITION AND SOIL FERTILITY)

CREDIT HOURS: 1

Syllabus Outline: Study of different media for plant growth, macro and micronutrients, determination of total water requirements.

Course Outline:

1. Sand and Water Culture Methods.
2. Study of Deficiency Symptoms of Macro and Micronutrient Elements.
3. Phenotypic Adaptations of plants to Nutrients, Deficiency and Methods of Growth Analysis.
4. Plant Tissue Analysis for Principle Inorganic Ions.
5. Determination of P, Ca and Mg Content of Soil.
6. Preparation of Fertilizer Mixtures.
7. Determination of total Water Requirements of a Crop by using Climatic Data (Blaney and Criddle Formula will be used).
8. Preparation of Standard Acid, Alkali and Indicator Solutions.

Module Aims: This Laboratory Course will help students to solve problems related to Soil Fertility and Fertilizers. Students will learn about various techniques of growing plants.

Learning Strategies:

1. Lectures
2. Group Discussion
3. Laboratory Work
4. Seminar/ Workshop

Learning Outcome: Experiments based on Theory Syllabus will be explored. Students will be able to grow plants in different media. Students will be able to observe different symptoms due to deficiency of various nutrients in the media

Assessment Strategies (Practical) :

The student will be assessed according to the following criteria

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Books Recommended:

1. Taiz, L.D. and Zeiger, E. (2010). Plant Physiology. (5th Ed.), Sierauer Associates.
2. Barker, A.V. and Pilbeam, D.J. (2007). Hand Book of Plant Nutrition. CRC Press Washington D.C.
3. Epstein, E. and Bloom, J.A. (2005) Mineral Nutrition of Plants: Principles and Perspectives. (2 Ed.), Sierauer Associates.
4. Tisdale, S. and Nelson, W. (2005). Soil Fertility and Fertilizers. (3rd Ed.), McMillans.
5. Wallace, T. (2005). The Diagnosis of Mineral Deficiencies in Plants. Her Majesty's Stationery Office, London.