UNIVERSITI TEKNOLOGI MARA

AGA701: PLANT ECOPHYSIOLOGY

Course Name (English)	PLANT ECOPHYSIOLOGY APPROVED
Course Code	AGA701
MQF Credit	3
Course Description	This course discusses the adaptations of plants to their environment. It emphasizes the morphological and physiological mechanisms in plants that influence plant establishment, the below- and above-ground productivity, and plant interactions such as competition, herbivory, and allelopathy. Plant physiological response and adaptation to environmental stress, e.g., solar radiation, temperature, drought, and nutrition in relation to the nature of phenotypic and ecotypic variations in plants will be discussed. Carbon allocation and dynamics in plants and in plant communities will also be discussed in this course.
Transferable Skills	Analytical reasoning Critical thinking Problem solving
Teaching Methodologies	Lectures, Blended Learning, Discussion
CLO	CLO1 Elucidate the morphological and physiological adaptations in plants that influence plant establishment in response to environmental stresses CLO2 Describe the role of environmental changes in alterations of plant carbon balance and growth CLO3 Revise the concepts of plant interactions with environment in sustainable plant production
Pre-Requisite Courses	No course recommendations

Topics
1. Physiological Trait Variation 1.1) Definition 1.2) Environmental influences 1.3) Phenotypic analysis 1.4) Inherent variation
2. Temperature Adaptation 2.1) High temperature stress 2.2) Cold tolerance 2.3) Carbohydrates and proteins conferring frost tolerance
3. Photosynthesis and Light Adaptation 3.1) Anatomy and ultrastructure of sun and shade leaves 3.2) Light response curve 3.3) Acclimation of photosynthesis to elevated CO2 concentration 3.4) Carbon gain and growth 3.5) Review on plant photomorphogenesis
4. Salinity and Salt Stress 4.1) Glycophyte and halophyte 4.2) Salt exclusion and excretion 4.3) Compartmentation and accumulation of compatible solutes
5. Drought Adaptation 5.1) Evaporative energy 5.2) Water use efficiency 5.3) Resurrection plant 5.4) Soil water management 5.5) Review on plant water relation

6. Mineral Nutrition 6.1) Acquisition of nutrients 6.2) Photosynthesis, nitrogen nutrition and leaf lifespan 6.3) Acclimation and adaptation of uptake kinetics 6.4) Ecosystem nutrient use efficiency
7. Yield Optimization 7.1) Seed dormancy and germination 7.2) Physiological basis of variation in relative growth rate 7.3) Assimilate allocation and partitioning 7.4) Juvenile phase and reproductive phase
8. Invasion Risk Throughout the Plant Life Cycle 8.1) Physiological ecology and plant distribution 8.2) Adaptive evolution 8.3) Biotic influences and allelopathy 8.4) New direction in plant ecophysiology

Assessment Breakdown	%
Continuous Assessment	70.00%
Final Assessment	30.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Individual Project	Video presentation.	20%	CLO3
Journal/Article Critique	Review of journal articles.	20%	CLO1
Test	Mid-term assessment.	30%	CLO1

Reading List

Recommended Text

- **Shabala, S. 2017, *Plant Stress Physiology*, CABI**

Reference Book Resources

- **Ernesto, M.V. 2016, *Agroecology: A Transdisciplinary, Participatory and Action-oriented Approach*, CRC Press**
- **Hank, J. 2015, *Agronomy: Science and Technology of Plants*, Callisto Reference New York**
- **Kumar, S. 2016, *Handbook of Plant and Crop Physiology*, Scitus Academics**
- **Pipe, R. 2015, *Handbook in Advances in Agroecology: The Science of Sustainable Agriculture and Sustainable Food Systems*, Koros Press United Kingdom**

Article/Paper List

This Course does not have any article/paper resources

Other References

This Course does not have any other resources