Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Izbrana poglavja iz fiziološke ekologije rastlin
Course title:	Selected Chapters of Physiological Plant Ecology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Biologija in ekologija z naravovarstvom, 2. stopnja	/	1/2	Poletni / Zimski
Biology and Ecology with Nature Conservation, 2nd cycle	/	1/2	Summer / Winter

Vrsta predmeta / Course type Izbirni / Optional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	15	15			135	6

Nosilec predmeta / Lecturer: Andreja URBANEK KRAJNC, Jana AMBROŽIČ DOLINŠEK

Jeziki / Languages:		
	Predavanja / Lectures:	Slovenski / Slovenian
	Vaje / Tutorial:	Slovenski / Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Pogojev ni.	None.

Vsebina:	**Content (Syllabus outline):**
V predmetu je podrobneje izpostavljen vpliv naravnih in antropogenih stresnih dejavnikov na fiziološke procese v rastlini. Učni načrt obravnava naslednja poglavja: Pomanjkanje in prekomerna svetloba. UV žarčenje. Pomanjkanja in prebitek vode. Ekstremne temperature. Pomanjkanje in problem prekomernih koncentracij soli. Mehanske poškodbe. Onesnaževanje z atmosferskimi oksidanti in ksenobiotiki.	The lecture focuses on the impact of natural and anthropogenic stress factors on physiological processes in plants. The following chapters are discussed:Deficiency and excess of light. UV radiation. Deficiency and excess of water. Extreme temperatures. Deficiency and high concentrations of minerals. Mechanical effects. Pollution with atmospheric oxidants

Vpliv radioaktivnosti v okolju na rastline. Funkcijske motnje celičnega metabolizma: • Toksični efekti kisika na rastline Tvorba prostih kisikovih radikalov, reakcije v celici • Motnje v metabolizmu ogljika Vplivi okoljskih dejavnikov na fotosintezo, fotorespiracijo, dihanje ter pretok in porabo ogljikovih hidratov v rastlini • Motnje v mineralni prehrani Vpliv okolja na presnovo mineralov; motnje v preskrbi; vpliv na simbiozo z rizosfernimi mikroorganizmi; podrobneje so izpostavljene motnje v privzemu, asimilaciji ter transportu žvepla, amonija in nitrata ter vgradnja v ogljikove spojine Odzivi rastlin na stresne dejavnike Obrambni in reparaturni mehanizmi, detoksifikacija prostih kisikovih radikalov z antioksidanti in encimi; aktualna dognanja o vlogi glutationa, askorbinske kisline, tokoferola in karotinoidov v obrambi pred oksidativnim stresom Bioindikacija onesnaževanja okolja Reakcijski in akumulacijski indikatorji, kazalci in testni organizmi, metode biomonitoringa	and xenobiotics. The impacts of environmental radioactivity on plants. Functional disturbances of cell metabolism • Toxic effects of oxygen on plants Formation of reactive oxygen species and reactions in the cell • Disturbances in carbon metabolism The influence of external factors on photosynthesis, photorespiration, respiration, the translocation and utilization of photosynthates in plants • Disturbances in mineral nutrition Habitat-related aspects of mineral metabolism; the disturbances in supply; the impact on symbiosis with the microorganisms in rhizosphere; th chapter focuses on the disturbances in the uptake, assimilation and transport of sulphur, ammonium ions and nitrate and their incorporation into carbon compounds The response of plants to stress factors Defense and reparatory mechanisms, detoxification of reactive oxygen species with antioxidants and enzymes; recent advances in the role of glutathione, ascorbate tocofero and carotinoides in defense agains oxidative stress Bioindication of pollution impacts Response and accumulation indicators, indicators and test organisms, biomonitoring methods

Temeljni literatura in viri / Readings:

Taiz, L., E. Zeiger, I. M. Moller, A. Murphy 2015: Plant Physiology. 6th Edition. Sinauer Associatites, Inc., Publishers, Sunderland, Massachusetts.
Sadras V.O. & Calderini D.F. 2009. Crop Physiology, Academic Press, Elsevier.
Larcher W., 2003. Physiological Plant Ecology. 4th Edition. Springer, Berlin.

Cilji in kompetence:	**Objectives and competences:**

• Posebna pozornost je posvečena aktualnim dognanjem o odzivu rastlin na izbrane okoljske dejavnike • Prepoznavanje toksičnih efektov kisika • Poznavanje funkcijskih motenj celičnega metabolizma • Vpogled v simptome poškodb na nivoju celic in celega organizma • Vpogled v obrambne in reparaturne mehanizme • Seznanjanje z rastlinsko bioindikacijo onesnaževanja okolja Uporaba analitičnih metod v ekofiziologiji in stresni fiziologiji rastlin	• Special attention is paid to the recent advances in the response of plants to stress factors • Recognisiton of toxic effects of oxygen • Knowledge of functional disturbances in cell metabolism • To get an insight into the injury patterns and symptoms on cell and whole plant level • An insight into the defense an reparatory mechanisms • Acquaintaince of plant bioindication of pollution Application of the analytical measurements in ecophysiology and stress physiology of plants

Predvideni študijski rezultati:	**Intended learning outcomes:**
Po uspešno opravljeni učni enoti naj bi bili študentje zmožni: • pojasniti toksične efekte kisika • prepoznati stresne dejavnike, prepoznavanje simptomov poškodb in osnovnih obrambnih in reparaturnih mehanizmov • načrtovati ter izvajati metod bioindikacije onesnaževanja okolja z rastlinami Študentje bodo pridobili znanja o principih in metodah v ekofiziologiji in stresni fiziologiji rastlin z namenom uporabe le-teh v praksi	By the end of this course students should be able to: • explain the toxical effects of oxygen • identify the particular stress factors, identification of injury patterns and symptoms, understanding the basic defense and reparatory mechanisms • design and conduct methods ofbioindication of pollution impacts with plants The students will achieve knowledge about the principles and methods in ecophysiology and stress physiology with the aim of the knowledge transfer to praxis.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Fitofiziološke raziskave z uporabo biokemijskih in fizioloških metod laboratoriju in na terenu s poudarkom na morfologiji in funkciji rastlin pod vplivom okolja • Samostojno delo	• Lectures • Phytophysiological research using biochemical and physiological methods in laboratory and in field with special attention to environmental impacts to plant morphology and functions • Independent work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
pisni izpit, seminarska naloga, projekt	**50 %** **25%** **25%**	examination, coursework, project

Reference nosilca / Lecturer's references:

URBANEK KRAJNC, Andreja, UGULIN, Tina, PAUŠIČ, Andrej, RABENSTEINER, Johannes, BUKOVAC, Vesna, MIKULIČ PETKOVŠEK, Maja, JANŽEKOVIČ, Franc, BAKONYI, Tamás, BERČIČ, Rebeka Lucijana, FELICIJAN, Mateja. Morphometric and biochemical screening of old mulberry trees (Morus alba L.) in the former sericulture region of Slovenia. *Acta Societatis Botanicorum Poloniae*, ISSN 2083-9480, 2019, vol. 88, no. 1, str. 1-22. https://pbsociety.org.pl/journals/index.php/asbp/article/view/asbp.3614, doi: 10.5586/asbp.3614. [COBISS.SI-ID 4562220]

ŽEBELJAN, Aleksandra, VICO, Ivana, DUDUK, Nataša, ŽIBERNA, Bojana, URBANEK KRAJNC, Andreja. Dynamic changes in common metabolites and antioxidants during Penicillium expansum-apple fruit interactions. *Physiological and molecular plant pathology*, ISSN 0885-5765, 2019, vol. 106, no. In progress, str. 166-174, ilustr., doi: 10.1016/j.pmpp.2019.02.001. [COBISS.SI-ID 4545324]

URBANEK KRAJNC, Andreja, RAKUN, Jurij, BERK, Peter, IVANČIČ, Anton. The impact of fruit temperature dynamics on heat stress tolerance of selected oil pumpkin genotypes. *Advances in horticultural science*, ISSN 0394-6169, 2017, vol. 31, no. 1, str. 61-73, doi: 10.13128/ahs-20727. [COBISS.SI-ID 4307500]

MECHORA, Špela, ŽERDONER ČALASAN, Anže, FELICIJAN, Mateja, URBANEK KRAJNC, Andreja, AMBROŽIČ-DOLINŠEK, Jana. The impact of selenium treatment on some physiological and antioxidant properties of Apium repens. *Aquatic botany*, ISSN 0304-3770. [Print ed.], 2017, vol. 138, str. 16-23, doi: 10.1016/j.aquabot.2016.12.002. [COBISS.SI-ID 22874888]

TURINEK, Maja, BAVEC, Martina, REPIČ, Milan, TURINEK, Matjaž, URBANEK KRAJNC, Andreja, MOELLERS, Christian, TRES, Alba, BAVEC, Franc. Effects of intensive and alternative production systems on the technological and quality parameters of rapeseed seed (Brassica napus L. 'Siska'). *Journal of the science of food and agriculture*, ISSN 0022-5142. [Print ed.], June 2017, vol. 97, iss. 8, str. 2647-2656, doi: 10.1002/jsfa.8088. [COBISS.SI-ID 4240684]