



OPIS PREDMETA / SUBJECT SPECIFICATION

Predmet:	Izbrana poglavja iz fiziološke ekologije rastlin
Subject Title:	Selected Chapters of Physiological Plant Ecology

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Biologija in ekologija z naravovarstvom / Biology and Ecology with Nature Conservation	Biologija; Ekologija z naravovarstvom / Biology; Ecology with nature conservation	1	2

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Lab. work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	15		15	15	135	7

Nosilec predmeta / Lecturer:

Jeziki / Predavanja / Lecture:
Languages: Vaje / Tutorial:

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:
Prerequisites:

Vsebina:	Contents (Syllabus outline):
<p>V predmetu je podrobneje izpostavljen vpliv naravnih in antropogenih stresnih dejavnikov na fiziološke procese v rastlini. Pomanjkanje in prekomerna svetloba. UV žarčenje. Pomanjkanje in prebitok vode. Ekstremne temperature. Pomanjkanje in problem prekomernih koncentracij soli. Mehanske poškodbe. Onesnaževanje z atmosferskimi oksidanti in ksenobiotiki. Vpliv radioaktivnosti v okolju na rastline.</p> <ul style="list-style-type: none"> Funkcijske motnje celičnega metabolizma <ul style="list-style-type: none"> 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 	<p>The lecture focuses on the impact of natural and anthropogenic stress factors on physiological processes in plants.</p> <p>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 and xenobiotics. The impacts of environmental radioactivity on plants.</p> <ul style="list-style-type: none"> Functional disturbances of cell metabolism <ul style="list-style-type: none"> 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,

<ul style="list-style-type: none"> • 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 glutathiona, askorbinske kisline, tokoferola in karotinoidov v obrambi pred oksidativnim stresom • Bioindikacija onesnaževanja okolja Reakcijski in akumulacijski indikatorji, kazalci in testni organizmi, metode biomonitoringa 	<p style="text-align: center;">respiration, the translocation and utilization of photosynthates in plants</p> <ul style="list-style-type: none"> • Disturbances in mineral nutrition Habitat-related aspects of mineral metabolism; the disturbances in supply; the impact on symbiosis with the microorganisms in rhizosphere; the 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, tocoferol and carotinoides in defense against oxidative stress • Bioindication of pollution impacts Response and accumulation indicators, indicators and test organisms, biomonitoring methods
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Temeljni študijski viri / Textbooks:

- Brunold, Ch., A. Rügsegger, R. Brändle, 1996: Stress bei Pflanzen. Verlag Paul Haupt, Stuttgart.
- Grill, D., M. Tausz, L. J. De Kok, 2001: Significance of glutathione to plant adaptation to the environment. Kluwer academic publishers, Dordrecht.
- Inzé, D., M. Van Montagu, 2002: Oxidative stress in plants. Taylor & Francis, Inc., New York.
- Larcher, W., 1991: Physiological Plant Ecology. Springer, Heidelberg.
- Taiz, L., E. Zeiger, 2002: Plant Physiology. Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts.
- Varma, A., R. P. Beckett, I. Kranner, 2002: Protocols in Lichenology: Culturing, Biochemistry, Ecophysiology, and Use in Biomonitoring. Springer, Heidelberg.

Cilji:

- Posebna pozornost je posvečena aktualnim dognanjem o odzivu rastlin na izbrane okoljske dejavnike
- Ponazoritev toksičnih učinkov kisika
- Predstavitev funkcijskih motenj celičnega metabolizma
- **Ponazoritev simptomov poškodb na nivoju celic in celega organizma**
- Vpogled v obrambne in reparaturne mehanizme
- Seznanjanje z rastlinsko bioindikacijo onesnaževanja okolja
- Predstavitev analitičnih metod v ekofiziologiji in stresni fiziologiji rastlin

Objectives:

- Special attention is paid to the recent advances in the response of plants to stress factors
- Illustration of toxic effects of oxygen
- Introduction to functional disturbances in cell metabolism
- Illustration of injury patterns and symptoms on cell and whole plant level
- An insight into the defense and reparatory mechanisms
- Introduction of plant bioindication of pollution
- Introduction to the analytical measurements in ecophysiology and stress physiology of plants

Predvideni študijski rezultati:

- Znanje in razumevanje:
- **Znanje in razumevanje odziva rastlin na izbrane okoljske dejavnike**
 - **Razumevanje toksičnih učinkov kisika**
 - Poznavanje stresnih faktorjev, prepoznavanje

Intended learning outcomes:

- Knowledge and Understanding:
- Knowledge and understanding of the response of plants to stress factors
 - Understanding of toxic effects of oxygen
 - Knowledge of stress factors, identification of injury patterns and symptoms, understanding the

<p>simptomov poškodb in osnovnih obrambnih in reparaturnih mehanizmov</p> <ul style="list-style-type: none"> • Usvojitev metod bioindikacije onesnaževanja okolja z rastlinami <p>Prenesljive/ključne spretnosti in drugi atributi:</p> <ul style="list-style-type: none"> • Pridobitev znanja o principih in metodah v ekofiziologiji in stresni fiziologiji rastlin ter uporaba le tega v praksi 	<p>basic defense and reparatory mechanisms</p> <ul style="list-style-type: none"> • Qualification of bioindication of pollution impacts with plants <p>Transferable/Key Skills and other attributes:</p> <ul style="list-style-type: none"> • Achieving knowledge about the principles and methods in ecophysiology and stress physiology for good practice
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Metode poučevanja in učenja:

<ul style="list-style-type: none"> • Predavanja • Ftofiziološke raziskave z uporabo biokemičnih in fizioloških metod v laboratoriju in na terenu s poudarkom na morfologiji in funkciji rastlin pod vplivom okolja • Samostojno delo

Learning and teaching methods:

<ul style="list-style-type: none"> • 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
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Načini ocenjevanja:

Delež (v %) /
Weight (in %)

Assessment:

<ul style="list-style-type: none"> • Seminarska naloga in njena predstavitev • Laboratorijski dnevnik • Pisni izpit 	<p>30 20 50</p>	<ul style="list-style-type: none"> • Seminar essay and its defense • Diary of laboratory results • Written exam
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Materialni pogoji za izvedbo predmeta :

<ul style="list-style-type: none"> • <i>Multimedijska predavalnica</i> • <i>Laboratorij za izvedbo laboratorijskih vaj z ustrezno opremo (svetlobni mikroskop, spektrofotometer, pH-meter, centrifuga, tehnica, steklovina, kemikalije)</i>

Material conditions for subject realization

<ul style="list-style-type: none"> • <i>Lecture hall for multimedia presentations</i> • <i>Laboratory with appropriate equipment (light microscope, spectrophotometer, pH-meter, centrifuge, scale, laboratory glassware, chemicals)</i>
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Obveznosti študentov:

(pisni, ustni izpit, naloge, projekti)

<ul style="list-style-type: none"> • Seminarska naloga in njena predstavitev • Laboratorijski dnevnik • Pisni izpit
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Students' commitments:

(written, oral examination, coursework, projects):

<ul style="list-style-type: none"> • Seminar essay and its defense • Diary of laboratory results • Written exam
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