



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

**Predmet:** Izbrana poglavja iz rastlinskih tkivnih kultur  
**Course title:** Selected Topics from Plant Tissue Cultures

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Doktorski študij Ekološke znanosti, 3. stopnja	/	1. ali 2.	1.- 4.;
Doctoral Study Ecological Sciences, 3rd degree	/	1 <sup>st</sup> or 2 <sup>nd</sup>	1 <sup>st</sup> - 4 <sup>th</sup>

**Vrsta predmeta / Course type**

Izbirni/Elective

**Univerzitetna koda predmeta / University course code:**

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Ter. Vaje Field work	Samost. delo Individ. work	ECTS
15	15				150	6

**Nosilec predmeta / Lecturer:**

Jana AMBROŽIČ-DOLINŠEK

**Jeziki /**

**Languages:**

**Predavanja / Lectures:** slovenščina / Slovene

**Vaje / Tutorial:** slovenščina / Slovene

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

Poznavanje botanike in fiziologije rastlin na ravni dodiplomskega programa prve stopnje ter ekofiziologije rastlin na ravni magistrskega programa druge stopnje.

**Prerequisites:**

Knowledge of botany and plant physiology at graduate level and plant ecophysiology at master level.

**Vsebina:**

**Content (Syllabus outline):**

Biologija gojenja rastlinskih celic, tkiv, organov in celih rastlin v pogojih tkivne kulture ter načini in uporaba rastlinskih tkivnih kultur v znanosti in v tržne namene.

Predmet v prvem delu obravnava lastnosti in tehnične značilnosti gojenja rastlin v tkivnih kulturah.

V drugem delu obravnava različne možnosti uporabe rastlinskih tkivnih kultur: mikropropagacijo, somatsko embriogenezo, eliminacijo virusov, krioprezervacijo, pridobivanje sekundarnih metabolitov, vključevanje tkivnih kultur v zaščito rastlinskih vrst in okoljevarstvo.

The biology of growing plant cells, tissues, organs and whole plants under tissue culture conditions, and the applications of plant tissue culture in science and commercial applications.

The first part of the course deals with the characteristics and technical features of plant cultivation in tissue culture.

The second part addresses the different applications of plant tissue culture: micropropagation, somatic embryogenesis, virus elimination, cryopreservation, production of secondary metabolites, the integration of tissue culture in the plant species conservation and environment protection.

### Temeljni literatura in viri / Readings:

Temeljna literatura / Basic literature:

Ambrožič-Dolinšek, J. (2017). *Laboratorijski priročnik za delo z rastlinskimi tkivnimi kulturami, s poudarkom na mikropropagaciji: laboratorij za fiziologijo rastlin* (str. II, 53). Univerzitetna založba Univerze. <https://doi.org/10.18690/978-961-286-072-1>

George, Edwin F.; Hall, Michael A.; De Klerk, Geert-Jan. (2008). *Plant Propagation by Tissue Culture*. Springer Netherlands. Dostop je mogoč iz prostorov Univerze v Mariboru in z oddaljenim dostopom za študente in zaposlene na Univerzi v Mariboru; <https://link-springer-com.ezproxy.lib.ukm.si/book/10.1007/978-1-4020-5005-3>

Priporočena literatura / Recommended readings:

George, E. F. (1993). *Plant propagation by tissue culture. Part 1, The technology* (2nd rev.ed., str. VIII, 574). Exegetics.

Bohanec, B. (1992). *Tehnike rastlinskih tkivnih kultur* (str. 168). Biotehniška fakulteta, Oddelek za agronomijo, Center za rastlinsko biotehnologijo in žlahtnjenje rastlin.

Pierik, R. L. M. (1997). *In vitro culture of higher plants* (str. V, 348). Kluwer Academic Publishers.

Chawla, H. S. (2009). *Introduction to plant biotechnology* (3rd ed., str. XXIX, 698, 16 pril.). Science Publishers.

Chawla, H. S. (2003). *Plant biotechnology: a practical approach* (str. VIII, 302). Science Publishers.

*Plant tissue culture concepts and laboratory exercises* (2nd ed., str. 454). (2000). CRC Press.

### Cilji in kompetence:

- Seznaniti študente s tehničnimi zahtevami vzgoje rastlin v tkivni kulturi.
- Pregledno seznaniti študente z različnimi načini uporabe rastlinskih tkivnih kultur v znanosti in v komercialne namene.

### Objectives and competences:

- To acquaint students with the technical requirements of growing plants in tissue culture.
- To give the students an overview of the different uses of plant tissue culture in science and commercial applications.

- Praktično usposobiti študenta za aseptično delo z rastlinskim materialom.

- To provide student practical training in aseptic work with plant material.

### Predvideni študijski rezultati:

#### Znanje in razumevanje:

- Osvoji tehnične zahteve vzgoje rastlin v tkivni kulturi kot so: priprava vcepkov in gojišč, rastlinskih rastnih regulatorjev, hormoni, značilnosti gojenja rastlin v tkivni kulturi.
- Ovrednoti razlike med različnimi tipi tkivnih kultur.
- Pojasni različne načine pridobivanja sekundarnih metabolitov in Pojasni postopek korioprezervacije.
- Predlaga in ovrednoti izbiro ustreznega gojišča, metodo mikropropagacije in *ex situ* strategijo varstva izbrane rastlinske vrste.

### Intended learning outcomes:

#### Knowledge and understanding:

- Acquire the technical requirements for cultivating of plants in tissue culture, such as: preparation of explants and growth media, plant growth regulators, hormones, cultivation of plants in tissue culture.
- Evaluate the differences between the different types of tissue culture.
- Explain the differences in the secondary metabolite production and the process for cryopreservation.
- Propose and evaluate the selection of appropriate medium, micropropagation method and *ex situ* conservation strategy for selected plant species.

### Metode poučevanja in učenja:

- Predavanja
- Seminarska naloga
- Laboratorijsko delo

### Learning and teaching methods:

- Lectures
- Seminar work
- Laboratory work

Delež (v %) /

### Načini ocenjevanja:

Weight (in %)

### Assessment:

- Seminarska naloga	50	- Seminar paper
- Raziskovalna naloga	50	- Research paper

### Reference nosilca / Lecturer's references:

AMBROŽIČ-DOLINŠEK, Jana, PODGRAJŠEK, Anja, ŠABEDER, Nik, MAZEJ, Zdenka, URBANEK KRAJNC, Andreja, TODOROVIĆ, Biljana, CIRINGER, Terezija. The potential of berula erecta in vitro for As bioaccumulation and phytoremediation of water environments. *Environmental pollutants & bioavailability*. 2023, vol. 35, no. 1, [article no.] 2205010, 12 str. ISSN 2639-5940. [Digitalna knjižnica Univerze v Mariboru – DKUM](#), DOI: [10.1080/26395940.2023.2205010](https://doi.org/10.1080/26395940.2023.2205010), DOI: [10.500.12556/DKUM-84870](https://doi.org/10.500.12556/DKUM-84870). [COBISS.SI-ID [151163139](#)]

TODOROVIĆ, Biljana, GRUJIĆ, Jaša Veno, URBANEK KRAJNC, Andreja, KRANVOGL, Roman, AMBROŽIČ-DOLINŠEK, Jana. Identification and content of astaxanthin and its esters from microalgae Haematococcus pluvialis by HPLC-DAD and LC-QTOF-MS after extraction with various solvents. *Plants*. 2021, vol. 10, iss. 11, str. 1-14. ISSN 2223-7747. DOI: [10.3390/plants10112413](https://doi.org/10.3390/plants10112413). [COBISS.SI-ID [84256003](#)]

MECHORA, Špela, RIŽNIK, Tadeja, URBANEK KRAJNC, Andreja, AMBROŽIČ-DOLINŠEK, Jana. Response of Berula erecta to lead in combination with selenium. *Bulletin of environmental*

*contamination and toxicology*. 2020, vol. 105, no. 1, str. 51-61, graf. prikazi. ISSN 0007-4861. DOI: [10.1007/s00128-020-02910-0](https://doi.org/10.1007/s00128-020-02910-0). [COBISS.SI-ID [22564355](#)],