

Tárgytematika / Course Description **Microalgae biology and biotechnology**

N_DMA03

Tárgyfelelős neve /

Teacher's name: dr. Molnár Zoltán

Félév / Semester: 2023/24/2

Beszámolási forma /

Assesment: Vizsga

Tárgy heti óraszám /

Teaching hours(week): 0/0/0

Tárgy féléves óraszám /

Teaching hours(sem.): 30/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The course gives an introduction into macro- and microalgae taxonomy based on traditional and molecular biological methods. The description of the prokaryotic (cyanobacteria) and eukaryotic divisions includes the main physiological characteristics, which significantly influence laboratory cultivation of microalgae, such as: photosynthetic pigments, photosynthesis, heterotrophic growth, regulation of buoyancy, nitrogen and phosphorus metabolism, and nitrogen fixation. The biotechnology component focuses on valuable compounds of microalgae and their possible use in the agriculture and renewable energy production. Microalgae compounds, which are useful in plant production and protection, like: (1) plant hormones, (2) antimicrobial compounds, (3) volatile organic compounds, and (4) toxins are highlighted. Evidence is presented showing that microalgae composition depends on environmental factors, which is the basis of biofuel production with microalgae.

TANTÁRGY TARTALMA / DESCRIPTION

1. Concept of algae. Characterisation of the prokaryotic algae (cyanobacteria).
2. Occurrence, reproduction, nitrogen fixation and photosynthesis of cyanobacteria.
3. Eukaryotic algae divisions: rhodophyta and heterokontophyta.
4. Eukaryotic algae divisions: cryptophyta, dinophyta and euglenophyta.
5. Eukaryotic algae division: chlorophyta and it's main classes.
6. Occurrence, reproduction, photosynthesis, as well as nitrogen and phosphorus metabolism of green

algae.

7. Establishment and maintenance of algal culture collections.
8. Plant hormone production and plant biostimulating activity of microalgae.
9. Cyanobacterial toxins and antimicrobial compounds of microalgae.
10. Volatile organic compounds of microalgae and their potential use.
11. Influence of environmental conditions on lipid content, lipid production and the fatty acid composition of microalgae.
12. Algal mass culture techniques.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

Meeting the conditions set by the supervisor.

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Graham, L. E., J. M. Graham, L. W. Wilcox (2009): Algae. Benjamin Cummings. pp.616.

Kiss K. T. (1998): Bevezetés az algológiába. ELTE Eötvös Kiadó, Budapest. pp.283.

Ács É. és Kiss K. T. (2004): Algológiai praktikum. ELTE Eötvös Kiadó, Budapest. pp.361.

Richmond, A. (Edit.) (2004): Handbook of microalgal culture: biotechnology and applied phycology. Blackwell Science, Oxford. pp.566.

Borowitzka, M. A. & L. J. Borowitzka (Eds.) (1989): Micro-algal biotechnology. Cambridge University Press, Cambridge. pp.477.

Ördög V. (2014): Mikroalgák biotechnológiai alkalmazása a növénytermesztésben és növényvédelemben.

AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL