

## Tárgytematika / Course Description

### Biotic and abiotic stress resistance of crops

N\_DMA10

Tárgyfelelős neve /

Teacher's name: dr. Molnár Zoltán

Félév / Semester: 2021/22/1

Beszámolási forma /

Assesment: Vizsga

Tárgy heti óraszám /

Teaching hours(week): 0/0/0

Tárgy féléves óraszám /

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

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### OKTATÁS CÉLJA / AIM OF THE COURSE

Plant growth and development is influenced by several biotic and abiotic environmental factors. Their intense and frequent appearance are perceived stressors. Within certain limits, plants can adapt to different living conditions in different ways. This is due to the ruggedness and possible change of the plant genetic program. Within the course first we deal with stress phenomena then with the specific and aspecific reactions. Traditional plant breeding does not always lead to an altered genetic background that would provide stress tolerance / resistance to crop production. As a result, there is a need to increase abiotic and biotic stress resistance using gene technology methods. Therefore, the description of plant gene technology and its results are also part of the curriculum.

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### TANTÁRGY TARTALMA / DESCRIPTION

1. The basic phenomena of plant stress (definitions, determination of stress, phases, stress responses).
2. Signal transduction processes (detection of environmental signal, reactive oxygen species (ROS) and their role in signal transduction, and calcium ion as a secondary messenger).
3. Temperature stress and protection (low and high temperature stresses, temperature sensing).
4. Stress caused by visible light (photo inhibition).
5. Heavy metals stress (physiological effects of heavy metals, signal transduction of heavy metal effects).
6. Oxidative stress and prevention (activation of oxygen, formation of activated oxygen species, oxidative stress mechanisms).

7. Protective mechanisms against insect pests and plant pathogens (pathogen-linked proteins, systemic acquired resistance).
8. Genetically modified (GM) plants (plant gene technology, production of transgenic plants, gene technology strategies).
9. Biotic stress resistant GM plants (resistance to pathogens).
10. Biotic stress resistant GM plants (pest resistance).
11. Abiotic stress tolerant / resistant GM plants (herbicide tolerant plants).
12. Abiotic stress tolerant / resistant GM plants (crops affecting extreme environmental impacts).

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## SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

Meeting the conditions set by the supervisor.

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## KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

**Gaur, R.K., Sharma, P.** (Eds.) (2014): Approaches to Plant Stress and their Management – Springer-Verlag Berlin Heidelberg.

**Hopkins W.G., Hüner, N.P.A.** (2009): Introduction to Plant Physiology – John Wiley and Sons, Inc., Hoboken, USA.

**Pessarakli, M.** (Eds.) (2010): Handbook of Plant and Crop Stress, 3rd Edition – CRC Press, Taylor and Francis Group, Boca Raton, London, New York.

**Ricroch, A., Chopra, S., Fleischer, S.J.** (Eds.) (2014): Plant Biotechnology - Experience and Future Prospects – Springer-Verlag Berlin Heidelberg.

