

## Tárgytematika / Course Description

### Soil moisture regime and the environment

**N\_DMA14****Tárgyfelelős neve /****Teacher's name:** dr. Makó András Szabolcs**Félév / Semester:** 2024/25/2**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 hydro(geo)logically and practically closed Carpathian Basin, particularly its deepest part Hungary and especially the Hungarian Plains have generally and relatively favourable agroecological potential conditions for multipurpose biomass production. However it does show high spatial and time variability, irregularity, and often extremes. Soil conditions have great (sometimes decisive) significance in the development of extreme hydrological situations (floods, water-logging, over moistening – droughts, over drying) and their economical, ecological, environmental and social consequences. The control of the soil moisture regime has an increasing importance from the viewpoints of multipurpose biomass production (moisture supply of plants) and environmental impacts. Rational and efficient soil moisture control is based on the comprehensive knowledge on the soil-water-plant system. During the course the participants are presented with a scientific basis of soil, in particular soil moisture control: getting information on soil, its physical/hydrophysical properties; soil moisture and substance regimes; agronomical and environmental relationships; reasons and consequences of extreme hydrological situations; alternatives; and limitations and methods of soil moisture control.

### TANTÁRGY TARTALMA / DESCRIPTION

1. Soil and sustainable development.
2. Soil as the most important multifunctional natural resource.
3. Soil as the basic element of agricultural water management.
4. Physical properties of soil (texture, structure, porosity; compaction).
5. The significance of soil structure in the fertility, productivity and environmental sensitivity of soil.
6. Moisture content, dynamism and energy relations, pF (water availability).
7. Movement of soil water (vapour transfer; saturated and unsaturated flow).
8. Category systems, mapping and monitoring of physical/hydrophysical properties, moisture and substance regimes of soil.
9. Soil reasons and consequences of extreme hydrological situations (flood, water-logging, over moistening – drought, over drying).
10. Limiting factors of water-supply of plants.
11. Relationships between the moisture regime and substance regime of soil (regime of plant nutrients, soil, groundwater and environmental pollution).
12. Role of water in soil degradation processes (erosion, salinisation/alkalisation, structure destruction, compaction).
13. Alternatives and limitations of soil moisture control (agrotechnics, amelioration, irrigation, drainage).
14. Soil moisture control as important element of rational, sustainable and efficient land-use, environment

## SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESSMENT'S METHOD

Meeting the conditions set by the supervisor.

---

### KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

**Várallyay, Gy.** (2003): A mezőgazdasági vízgazdálkodás talajtani alapjai. Egyetemi jegyzet. FVM Vízgazd. Osztály, Budapest-Gödöllő. 167 p.

**Várallyay, Gy.** (2009): Soil degradation processes and extreme soil moisture regime as environmental problems in the Carpathian Basin. In: Scientific and Social-Institutional Aspect of Central Europe and USA. Vol. XXXVIII-XXXIX. Pollution and Water Resources, Columbia University Seminars Proceedings. (Ed.: Halasi-Kun, G. J.) pp. 181-208.

**Várallyay Gy.,** (2010): Increasing importance of the water storage function of soils under climate change. *Agrokémia és Talajtan*, 59. (1) 7-18.

**Várallyay, Gy., Szabóné Kele, G.; Berényi Üveges, J., Marth, P., Karkalik, A., Thury, I.** (2010): Soil Conditions in Hungary based on the data from the Soil Conservation Information and Monitoring System (SIMS). Ministry of Agriculture and Rural Development. Budapest. ISBN 978-963-06-6861-3.

---

### AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL