

EGU23-6072, updated on 24 Feb 2024

<https://doi.org/10.5194/egusphere-egu23-6072>

EGU General Assembly 2023

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## Irrigation decision support unit

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Efficiency of irrigation is curtailing for lowering water consumption in intensive agriculture. High water consumption for irrigation of vegetables is driver of small catchments water disbalance and creates problems in proper and efficient running of irrigation systems. High energy consumption also lowers the economical efficiency of small farms.

Ongoing project aims to develop simple and reliable, yet easy to reproduce decision support device. Core part of the device are measuring of the soil moisture content in field in cheap way. 3D printed design in combination with open-source low-cost electronics is utilized. Methodology and results of the ongoing research project will be presented. Project investigates the affordable and simple technical measures that have a potential to increase the number of opportunities for the measuring of soil moisture content.

Device consist of six soil moisture humidity sensors, air temperature and humidity sensor. Rainfall gauge and wind speed gauge is being currently developed. Centerpiece of the device is Arduino Mega board. This microcontroller serves as a control unit of the device, writes measured data to the microSD card, do all the necessary calculations and communicates with the user. Unit is powered via the two 6V solar panels. These solar panels also serve as an indirect solar radiation measuring device. Measuring step 10 minutes is chosen.

Continuously the theories are developed and tested, subsequently conclusions are implemented into the next generation of the device. Durability and reliability of the device is tested in laboratory setup and in a field. Laboratory setup consists of a growing tent with four planting pots. In each planting pot one tomato plant is grown. Growing tent is also equipped with UV lights and ventilation to allow all year-round testing. Planting pots are filled with soil from outdoor experimental plots, this allows us to simulate different scenarios without a need to wait for suitable weather conditions. Two and two planting pots are placed in a common basins, this enables draining and flooding of the soil and comparative testing of two different scenarios. In field developed unit is placed alongside professional meteorological station EMS Brno, which measures soil moisture in four depths, rainfall height, wind speed, solar radiation and air temperature and humidity.

The laboratory setup is placed in the building of CTU Faculty of Civil Engineering in Dejvice, the experimental sites are located roughly 30 km to the north and north-west from Prague. In the

fields near villages Libiš and Hlavenec. Both places have different soil type and irrigation method. Libiš has Fluvisols and is irrigated via large scale river supplied sprinkler irrigation system, Hlavenec has Phaeozems and irrigation is done via drip or small sprinkler fed from a small on-site reservoir. Water balance is monitored in all testing localities.

The research is funded by the Technological Agency of the Czech Republic (research project SS01020052 – Utility and risk of irrigation over the Czech Republic in changing climate)