



## **Altered microclimatic conditions and the physiological adaptation of *Vicia faba*/potato in an agrivoltaic system**

**Supervisors:** Jun.-Prof. Andreas Schweiger (Plant Ecology, 320b), Lisa Pataczek (Plant Ecology, 320b)

### **Project description**

The use of solar panels on arable land and, hence, the simultaneous production of energy and agricultural produce is called agrivoltaics, increasing the land use efficiency many times over separated production of both.

In temperate regions solar radiation might be the plant growth limiting factor in these systems. However, recent studies showed that microclimatic conditions in agrivoltaics system are altered. An increase of soil moisture and a decrease of soil temperature is reported underneath the solar panels, as well as a reduction of evapotranspiration (Marrou et al., 2013a,b; Adeh et al., 2018). However, the conditions in these systems are also expected to be heterogeneous, based on the design itself: Fluctuating shade, water drip edges of solar panels and precipitation shadows result in differences of soil moisture within the system. Hence, the aim of this project is to assess the heterogeneous conditions in the agrivoltaic system of the community farm "Heggelbach" (Herdwangen-Schönach, close to Lake Constance), based on plant water potential, air humidity and temperature, as well as soil moisture measurements (volumetric water content and matrix potential) and their effect on the assimilation, transpiration and, ultimately, yield of *Vicia faba* and/or potatoes. Measurements should take place during the upcoming season 2023 on a regular basis and along a gradient in the system.

**Type of project:** Fieldwork and labwork

**Duration of the work:** *Vicia faba* will approx. be sown in March 2023 and harvested in August 2023. Potatoes will be planted approx. in the end of April/beginning of May and will be harvested in September. Measurements should be conducted from April 2023 on, until harvest in August/September 2023.

**Other important information:** The research site on the Heggelbach Hof (Herdwangen-Schönach) is far away from the campus, close to Lake Constance. A driving license would be necessary to get to the site. Cost takeover for car rental (university car pool) can be provided. On days, when you are going to the field, you will be out all day. When staying on the site over several days, accommodation can be provided.

### **For further information please contact:**

Jun.-Prof. Andreas Schweiger: [andreas.schweiger@uni-hohenheim.de](mailto:andreas.schweiger@uni-hohenheim.de)

Lisa Pataczek: [lisa.pataczek@uni-hohenheim.de](mailto:lisa.pataczek@uni-hohenheim.de)

### **References**

Adeh, E.H., Selker, J.S., Higgins, C.W. (2018). Remarkable agrivoltaic influence on soil moisture, micrometeorology and water-use efficiency. PLoS ONE 13(11): e0203256. DOI: 10.1371/journal.pone.0203256

Marrou, H., Guillioni, L., Dufour, L., Dupraz, C., Wery, J. (2013a). Microclimate under agrivoltaic systems: is crop growth rate affected in the partial shade of solar panels? *Agricultural and Forest Meteorology*, 177: 117–132.

Marrou, H., Dufour, L., Wery, J. (2013b) How does a shelter of solar panels influence water flows in a soil–crop system? *European Journal of Agronomy*, 50: 38–51.