P2 – Agroecological assessment of the cup plant (*Silphium perfoliatum* L.) as a biomass crop of the future

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To counteract short maize crop rotations and monotonous agricultural landscapes, the cup plant *Silphium perfoliatum* with its high yielding ability is a promising candidate for biomass production. The perennial lifecycle, long-lasting flowering period and low tillage imply positive effects on biodiversity and ecosystem services. Experience from agricultural practice also indicates a comparatively high drought tolerance of *S. perfoliatum*.

We investigate the impact of *S. perfoliatum* on agroecosystems with a focus on functional aspects of biodiversity and water use. The aim is to provide scientific guidance for a sustainable establishment of the cup plant cropping system. The project is divided into two work packages:

**WP1** Biodiversity and ecosystem functions above- and below-ground

Above-ground we perform
- Qualitative and quantitative assessment of the flower-visiting insect community in a landscape context
- Analysis of plant-pollinator networks of the cup plant and surrounding crops
- Examination of quality and quantity of the cup plant’s floral resources (nectar and pollen)
- Assessment of the seasonal habitat quality for pest and beneficial organisms as well as arable weeds

Below-ground we perform
- Assessment of soil fauna communities: Nematode (micro-), collembolan (meso-) and earthworm (macrofauna) diversity in
  - crop stands of different age
  - during the vegetation period
- Evaluation of the functional role of soil biodiversity
- Analysis of decomposition dynamics of crop residues
- Assessment of earthworm soil surface castings
- Analysis of C- and N- dynamics in soil

**WP2** Water balance and ecophysiology

- Analysis of water consumption in permanent culture
- Assessment of water use efficiency on single leaf and field plot level
- Characterisation of the root system depending on the soil moisture
- Testing the significance of the “cups” for the water balance
- Monitoring of soil water content over the course of the year
- Studying the temporal development of soil cover and leaf area index

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([http://www.vti.bund.de/de/startseite/institute/bd/projekte/silphie.html](http://www.vti.bund.de/de/startseite/institute/bd/projekte/silphie.html))
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