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

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Introduction

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*.

The Research Project

We investigate the impact of *S. perfoliatum* on agroecosystems with a focus on functional aspects of biodiversity and water use. The project will provide scientific guidance for a sustainable establishment of the cup plant cropping system.

The project is divided into two work packages: WP1 analyses above- and below-ground biodiversity and ecosystem functions and WP2 assesses water balance and ecophysiology of *S. perfoliatum*.

WP1 Biodiversity and ecosystem functions

**Above-ground**
- 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**
- 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
- 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