The Potential of Selected Wild Plant Species as Crops on Poor Soil

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Background

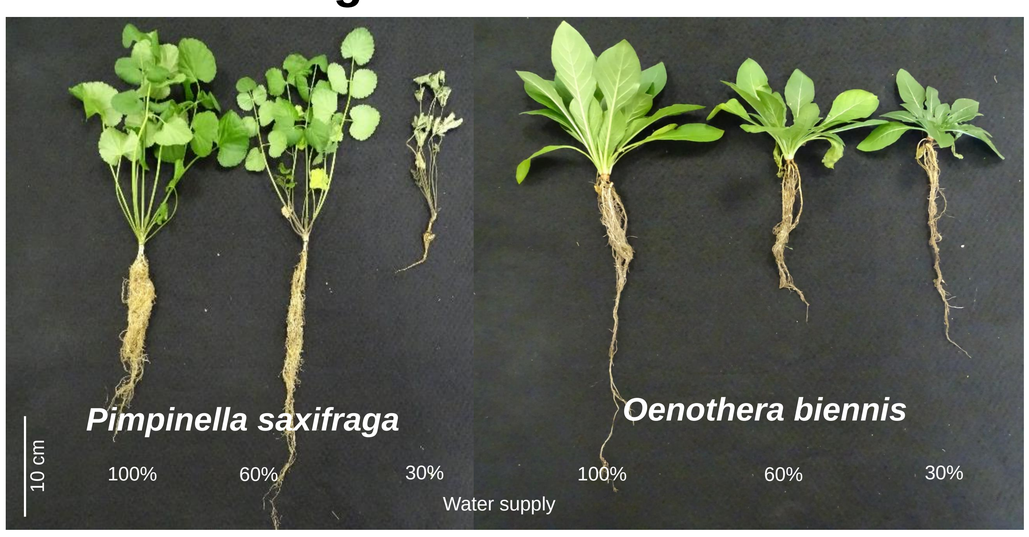
Wild plant species make a valuable contribution to an intact natural environment by supporting important ecosystem services. Certain wild plant species can contribute as catch crops to improved soil structure, humus build-up and increased microbial diversity in agricultural soil. Numerous wild plant species accumulate high-value compounds with pharmacological, antimicrobial or antioxidative effects and are thus been used for a long time as medicinal plants. Because they require considerably less fertilizer than conventional crops and are resilient to heat and drought, those plant species could be an alternative to cultivated crops on poor or salinized soils. Here we evaluated the potential of selected wild plant species (*Pimpinella saxifraga*, *Oenothera biennis*) to be used as crops on these soils.

- High antimicrobial activity in seeds and roots
- Culinary herb
- Fleshy root formation to loosen compact soils

- high content of polyunsaturated omega-6 fatty acids: production of cosmetics, treatment of skin diseases
- Fleshy root formation to loosen compact soils

Results

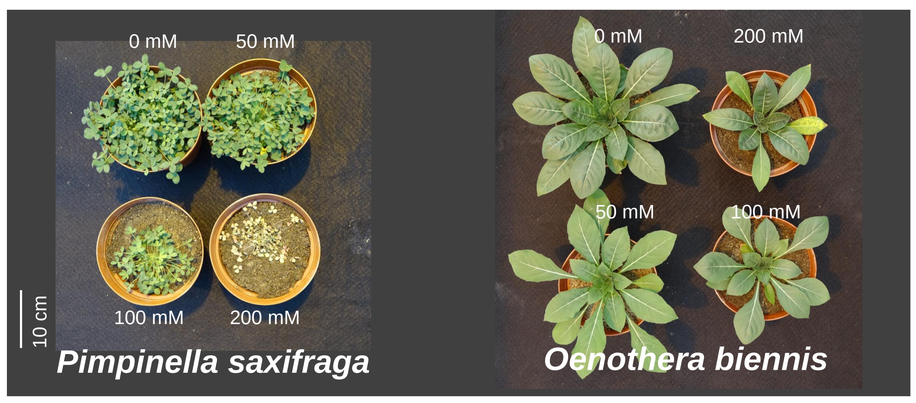
Drought stress tolerance



Method:
- pot experiment with three irrigation levels of soil water holding capacity, substrate: slightly loamy diluvial sandy soil mixed with vermiculite (1:1, V:V), stress treatment for 6 weeks
- biomass data was recorded (fresh weight, dry weight)

Result:
- shoot water content of *O. biennis* remained nearly constant between 90 % and 80 %, while a strong reduction was observed for *P. saxifraga* declining from 80 % to 50 % shoot water content

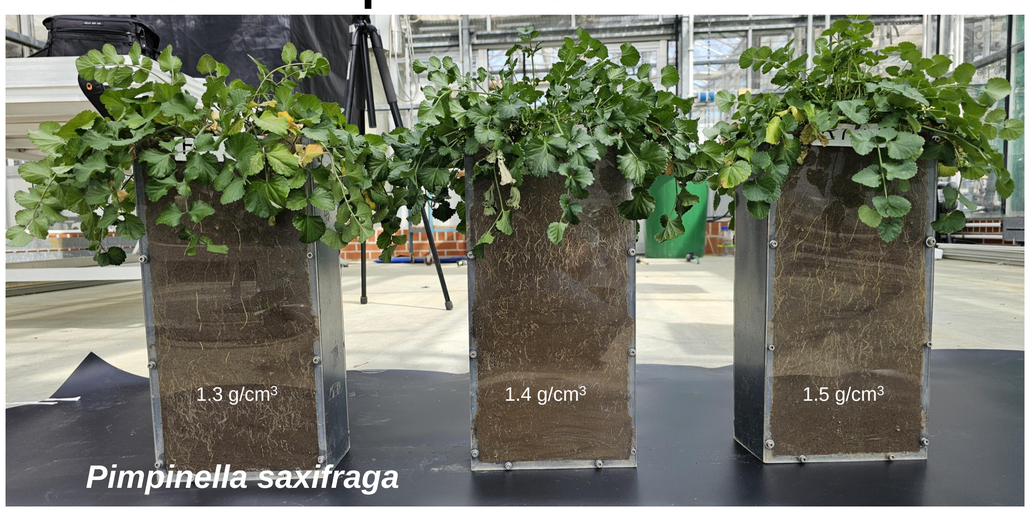
Salt stress tolerance



Method:
- pot experiment with three salt levels: 0 mM, 50 mM, 100 mM, 200 mM NaCl, substrate: slightly loamy diluvial sandy soil mixed with vermiculite (1:1, V:V), salt stress treatment for 6 weeks
- biomass data was recorded (fresh weight, dry weight)

Result:
- *O. biennis* was able to grow in presence of up to 200 mM NaCl, while *P. saxifraga* did not tolerate this NaCl concentration

Soil compactness tolerance



Method:
- rhizobox experiment with three levels of soil compactness using *P. saxifraga*, substrate: slightly loamy diluvial sandy soil, plant growth for 6 weeks
- biomass data was recorded (fresh weight, dry weight), root architecture characteristics

Result:
- tested soil compactness levels affected root and shoot growth, detailed analyses on root architecture adaptation are ongoing

Outlook

The presented experiments revealed a broad range of plant plasticity in response to the treatments. Our data indicate that wild plant species are suitable to replace glycophytic crops to some extent. However, further research is necessary to optimize the plant germplasm as well as agricultural production systems.

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