

# Biofortified and climate-resilient food and fodder production on marginal soils



**HelmholtzZentrum münchen**

Deutsches Forschungszentrum für Gesundheit und Umwelt



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**FACCE SURPLUS**  
SUSTAINABLE AND RESILIENT AGRICULTURE  
FOR FOOD AND NON-FOOD SYSTEMS

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# The best team:

- **Evelin Loit**, Estonian University of Life Science, **Estonia**
- **Wieslaw Szulc and Beata Rutkowska**, Warsaw University of Life Sciences, **Poland**
- **Michel Mench**, INRAE (National Research Institute on Agriculture, Food and Environment), **France**
- **Francois Rineau**, UHasselt **Belgium** (Flanders: FWO)
- **Peter Schröder**, Helmholtz Zentrum München GmbH, **Germany**
- **Virmantas Povilaitis and Renaldas Žydelis**, Lithuanian research centre for agriculture and forestry, **Lithuania**



# Focus on marginal soils

In line with decreasing productivity of arable soils and progressing climate change, agricultural science and practice will have to develop new strategies to increase quantity and quality of food and feed.



Marginal site on a farm in Upper Bavaria; Germany.



Former brownfield soil at Saint-Médard d'Eyrans in southern France.  
BioFoodOnMars; Evelin Loit



Discussion

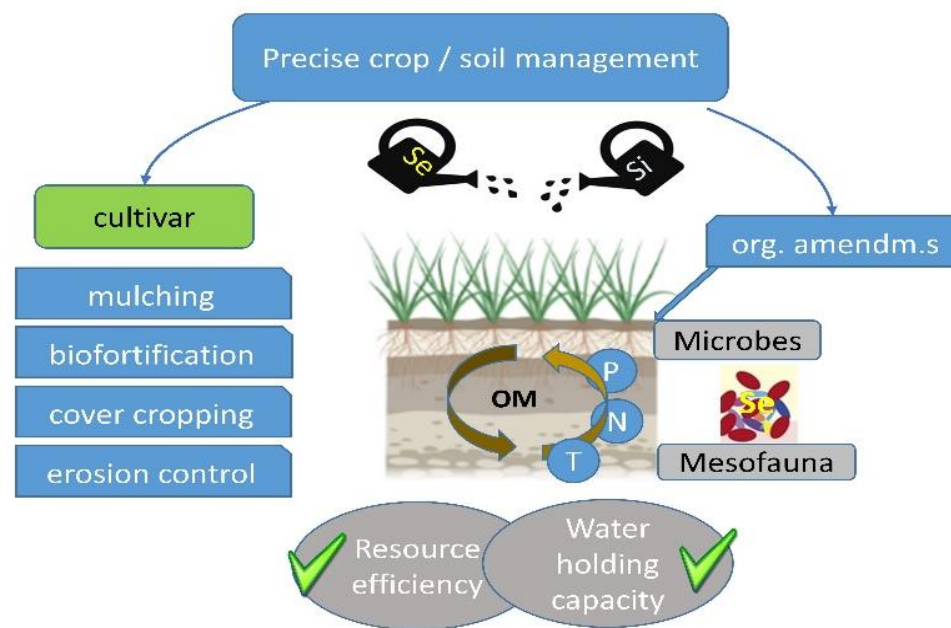
Relaunch cropping on marginal soils by incorporating amendments and beneficial trace elements in an interdisciplinary approach

Schröder, P, Mench, M, Povilaitis, V, Rineau, R, Rutkowska, B, Schloter, M, Szulc, W, Žydelis, R, Loit, E.  
**Relaunch cropping on marginal soils by incorporating amendments and beneficial trace elements in an interdisciplinary approach.** Science of The Total Environment, 2022  
<https://doi.org/10.1016/j.scitotenv.2021.149844>.



# Aims of the project

Mapping of potential crop yields and the valorization opportunities on marginal soils under various regional conditions in Europe and trying to optimize the biomass production and valorization with biofertilizers or soil additives, like silicon, or management changes.





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# Testing marginal land for food, feed and energy crops on:

- (1) dry (low water-holding capacity) - agricultural;
- (2) low organic matter content - agricultural;



Typical for post-glacial Tertiary Hill-lands of upper Bavaria: Spatial heterogeneity, some difference in water and nutrient availability: the farmer considers it as „marginal“



Field trials in Estonia (n=2), Germany (n=1), Poland (n=2), France (n=2) and Lithuania (n=2) with and without inorganic fertilization in combination with either foliar Si or Se fertilization.



## (3) contaminated - former industrial and agricultural land





# Same thing, but in the future climatic conditions



=test the effect of Si amendment in future climate

Unit	1	3	4	6	10	11
Ecosystem				Si	Si	Si
Climate	2070	2070	2070	2070	2070	2070



# Processed organic matter (OM) can stabilize yields and improve soils by fostering soil, microbiota and crop interactions.

Soil 1: more sandy soil, top of the field



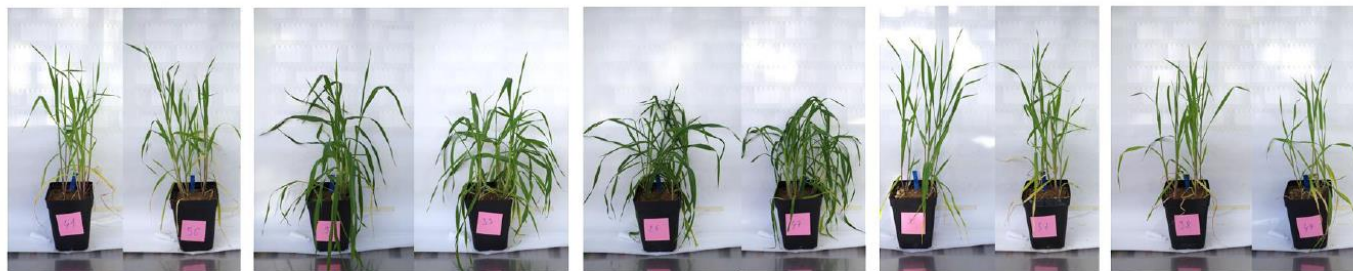
controls

N P K 100

N P K + Si

Pellets

Pellets + Si



controls

N P K 100

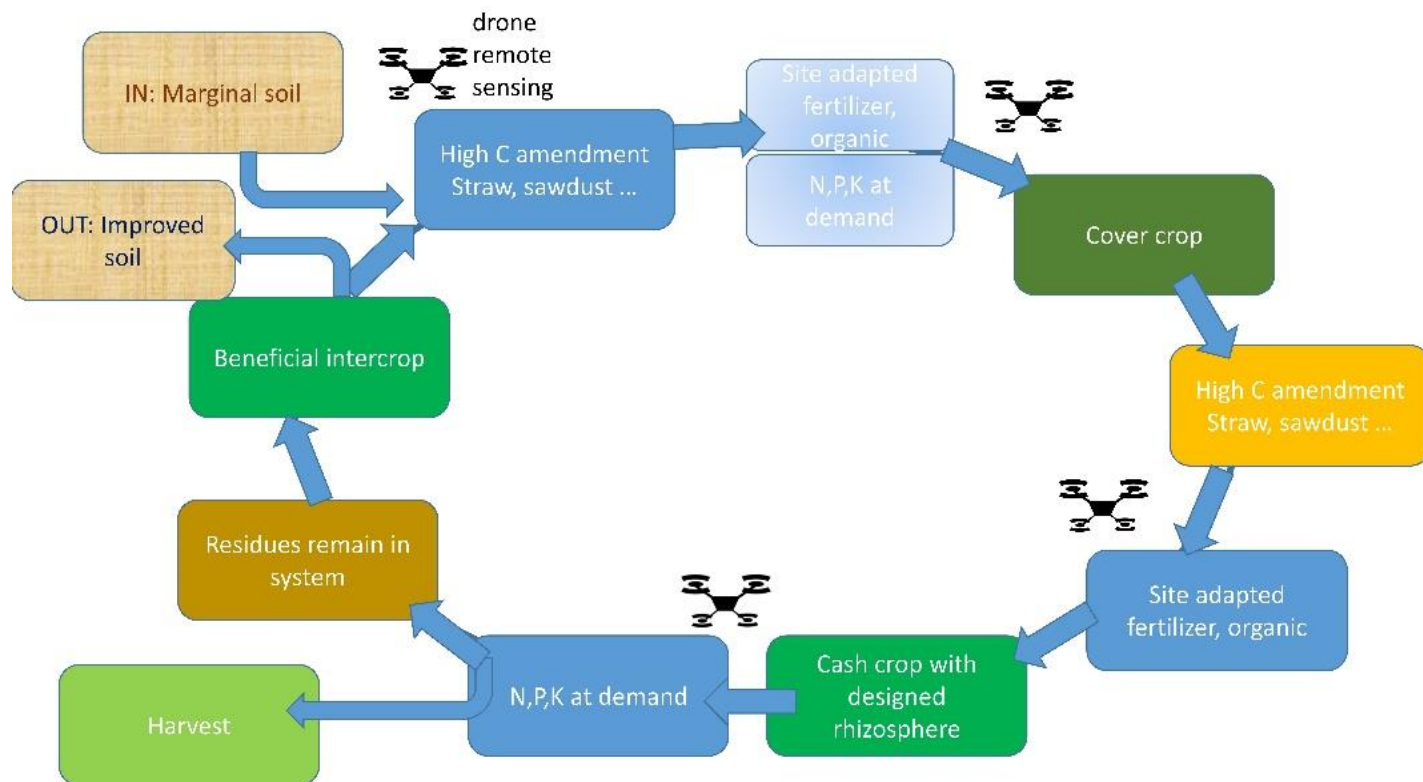
N P K + Si

Pellets

Pellets + Si

Soil 2: more loamy, clayey, heavier soil, bottom of the field





## Next up:

- Remote sensing
- Modelling
- Cost-effectiveness



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# Thank you for your attention!

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