Biomass and bioenergy production in organic agriculture.

Consequences for soil fertility, environment, spread of animal parasites and socio-economy.

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BIOCONCENS

A 4-year interdisciplinary project

Energy production and energy use in organic agriculture (OA) need to be addressed in order to reduce the reliance on non-renewable fossil fuels and minimize greenhouse gas (GHG) emissions. Thus, there is an obligation to find consensus between the apparent opposing aims of renewable (bio) energy production and soil fertility in OA. This project aims at designing and evaluate a combined concept for biomass and bio-energy production in OA, while considering soil fertility.

WP1 Co-production of biogas, bioethanol and animal feed from organic raw materials

Convert grass-clover, animal manure, energy crops (maize and rye) and agro-industrial by-products from organic farming to biogas, bioethanol and fodder protein.

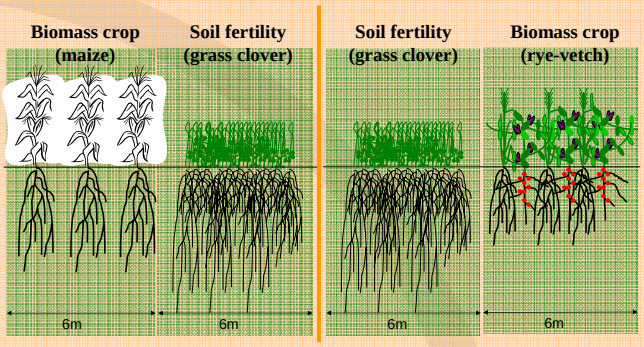
Design processes for the co-production of biogas and bioethanol/protein fodder in an organic coordinated plant and evaluation of energy balances.

WP2 Strip intercropping for biomass production

Determine the effect of intercropping a grass-clover based perennial forage crop mixture and annual biomass crops in strips on the biomass and grain yields compared to sole cropping of the same species.

Determine the interactions between intercrop border rows and associated mechanism responsible for a potentially improved crop growth resource use compared to sole cropping.

Determine the effects of green manure from the soil fertility-building strip on the annual biomass crops and the effect of nutrients and residues recycled from biogasification on plant growth.



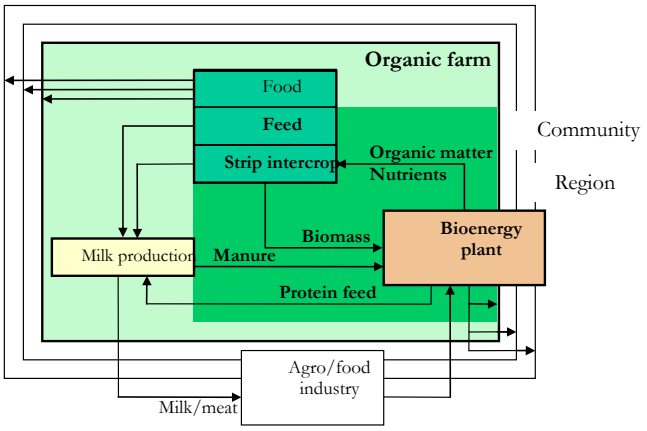
WP3 Effects of bioenergy production on soil quality and survival of parasites and weed seeds.

Determine soil quality as affected by application of animal manure (non-treated, processed in biogas reactors or aerobically decomposed)..

Determine trends in the effects of the manure treatments on the genetic and functional diversity of microbiota, the soil structure, and the organic matter content and its quality over the entire project period.

Measure the capability of the biogasification in inactivating parasite eggs in the manure.

Determine the effect of biogasification on the survival of weed seeds in manure.



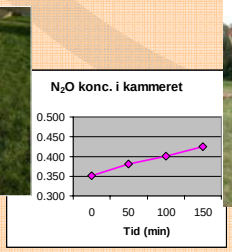
Relationship between experimental elements (dark green) vs. socio-economic up-scaling in BioConcens.

WP4 Emissions of greenhouse gases from strip intercropping and green/animal manures

Determine emissions of nitrous oxide (N_2O) associated with strip intercropping systems.

Determine emissions of non-CO_2 greenhouse gases (N_2O and CH_4) associated with i) application of bioenergy residues for agronomic purposes, and ii) storage (pre-treatment) of green/animal manure for bioenergy utilization.

Assess stability and C-sequestration potentials of bio-energy residues.



WP5 Scenarios for bio-energy production in organic agriculture and socio-economic analysis

Carry out detailed partial analyses of corporate and socio-economic, environmental and energy balance effects of investigated alternatives in WP1 to WP4 within OA. The socio-economic analyses include quantification and monetization of externalities.

Define scenarios and carry out scenario analyses of the overall corporate and socio-economic, environmental and energy balance consequences of integrating biogas production and bioethanol production in OA.

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