

## Biogas as Tool for Improvements in Organic Crop Production

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### Abstract

*Organic crop production faces major challenges, which to some extent can be met by production of biogas and slurry from organic energy crops.*

*1. More and more land must be converted into organic farming in order to meet the increasing demands for organic products. The supply of nutrients from biogas slurry from energy crops contributes to providing security for organic farmers, hence motivating more conventional farmers to convert their production.*

*2. The purpose of phasing out conventional slurry for organic crops and attaining self-sufficiency in nutrients can be achieved by producing biogas slurry from energy crops. In crop rotation experiments, the processing of energy crops into slurry has increased grain yields by 24 percent.*

*3. The increasing infestation of perennial weeds in organic crop rotation due to monocultural practices requires more diverse crop rotations. Energy crops open up the possibility of developing strategies for preventing and controlling weeds.*

*4. Organic crop rotations and production strategies can become even more environmentally friendly by reducing nitrogen losses and greenhouse gas emissions. The cultivation of energy crops for biogas production can promote a better environmental profile for organic farms.*

*5. Through the production of biogas from energy crops, the role of organic farmers may shift from net energy consumer to net energy producer.*

*This study examines the economic consequences of establishing biogas productions on three organic farms. Moreover, the study discusses some perspectives on the role of biogas in organic farming.*

*The study shows that sale of energy crops and purchase of biogas slurry improves the financial performance of all three farms, provided that the price of the energy crops covers the production costs. This is due to the increased yields of organic grain.*

*The improvements of the financial performance of the farms are closely related to the access to additional organic slurry and the resulting yield increase. The sole supply of energy crops does not have a positive effect on the farm economy, as the crop profit is insignificant. The greatest financial improvement was calculated on the farm with the largest relative area of energy crops.*

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*Besides sustainable nitrogen supply in the crop rotation, the biogas plant provides a number of strategic options, such as the possibility of growing specific N-demanding crops, taking in new land for conversion and growing energy crops in the conversion period.*

*Biogas plants also provide a portal for recycling waste products from industries and households, thus reusing other nutrients than nitrogen, provided that these products can safely be used in organic farming and they comply with current organic regulations.*

*There is a great need for further development of this concept, including calculating energy balances for different solutions. A discussion of the implications of this technology on farm diversity, soil quality response, energy balances, as well as crop quality is needed.*