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Site-adapted cultivation of bioenergy crops – a strategy towards a greener and innovative feedstock production

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Cultivation of bioenergy crops is of increasing interest to produce valuable feedstocks e.g. for anaerobic digestion. In the past decade, the focus was primarily set to cultivation of the most economic viable crop, namely maize. In Germany for example, the cultivation area of maize was expanded from approx. 200,000 ha in 2006 to 800,000 ha in 2015. However, this process initiated a scientific and public discussion about the sustainability of intense maize cultivation. Concerns addressed in this context are depletion of soil organic matter, soil erosion and compaction as well as losses of (agro-)biodiversity. However, from a soil science perspective, several problems arise from not site-adapted cultivation of maize. In contrast, the cultivation of perennial bioenergy crops may provide a valuable opportunity to preserve or even enhance soil fertility and agrobiodiversity without limiting economic efficiency. Several perennial energy crops, with various requirements regarding stand conditions, allow a beneficial selection of the most suitable species for a respective location.
The study aimed to provide a first step towards a more strategic planning of bioenergy crop cultivation with respect to spatial arrangement, distribution and connectivity of sites on a regional scale. The identification of pedological site characteristics is a crucial step in this process. With the study presented, we tried to derive site information that allow for an assessment of the suitability for specific energy crops. Our idea is to design a multifunctional landscape with a coexistence of sites with reduced management for soil protection and highly productive site. By a site adapted cultivation of perennial energy plants in sensitive areas, a complex, heterogeneous landscape could be reached.