Silphium perfoliatum: A Newcomer for an Ecologically Sustainable Energy Agriculture

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The importance of soils for the environment and for humans is often underestimated. Soils are an integral component of nutrient and water cycles and ultimately constitute our basis of life. In our project, we have comparatively analyzed the two energy crops corn (Zea mays) and cup plant (Silphium perfoliatum). The latter is new to energy agriculture and its impact on the environment has not been studied before. Because of its major differences to corn we examined the two energy crops considering water retention, nitrate filtration capacity, influence on humus formation and potential for reintegration of depleted soils. Various soils were regularly sampled and independently analyzed with biochemical methods. To be able to receive usable data, simulation boxes were built and agricultural areas were observed regularly by measuring the humidity in dependence of different weather phenomena. Additionally, the crops were established on a field with disadvantageous soil conditions and different cultivation methods were compared. The results of numerous laboratory and field trials show that cultivation of the cup plant guarantees a better hydrologic balance, and therefore better nitrate retention of agricultural soils. It obtains water more evenly from different soil layers and prevents leakage even with heavy rainfalls. Moreover, it promotes humification and a successful establishment on poor soils is possible. Thereby, its phytomass can be increased by undersowing it with alfalfa. The cultivation of the cup plant can therefore be recommended especially in the context of climate change, in areas where erosion is prominent and water protection is needed.