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A plea to better feed African soils

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Most African cropping system are rainfed. Rain is distributed at the soil surface over infiltration and runoff. The infiltrated water is stored in the rootable soil layer and the excess drains below that layer into the groundwater. The stored water is partly lost as evaporation to the atmosphere and partly used as transpiration for plant growth. In African cropping system the green water use efficiency (GWUE: fraction transpiration over rainfall) is as low as 15%. This low value is due to the often poor soil quality (physical, chemical and biological) of African soils. The poor physical state causes a weak soil structure resulting in crust formation with low infiltration and high runoff as consequences. The water holding capacity of the rootable soil layer is also poor, causing quite some water lost into deeper layers. African soils are poor due to long time soil mining. Soil life depends on soil organic matter (SOM) which is decreasing everywhere at an average rate of 2% per year. It is common sense that an improved soil quality is essential for improved food security. The key that triggers a sustainable improvement in soil quality is a system's approach that focus on the management of organic resources. Soil is a living organism, and it feeds on SOM. This feed is continuously consumed but a living soil makes new SOM out of fresh organic matter. In order to keep our soils alive we need cropping systems that feed our soils with fresh organic matter in the form of crop residues in the right mix of quality and quantity. The tendency to breed crops with a high harvest index (hence low straw) and the many other uses of crop residues (competing claims) with it recent use for bio-ethanol fabrication is disastrous for our living soils. If we continue to allow SOM to decrease, soil crusting and hard setting will increase with less end less water available for the production of green biomass. Lower available water will trigger a negative spiral with lower food security and still lower green matter for transformation into SOM. We need cropping systems where organics outputs and inputs are in balance in order to keep African soils alive. Only then we can easily raise the GWUE from 15 to 30% and double African food production.