ICLF in cooperative systems: a strategy to achieve net positive environmental and socioeconomic budgets

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Introduction

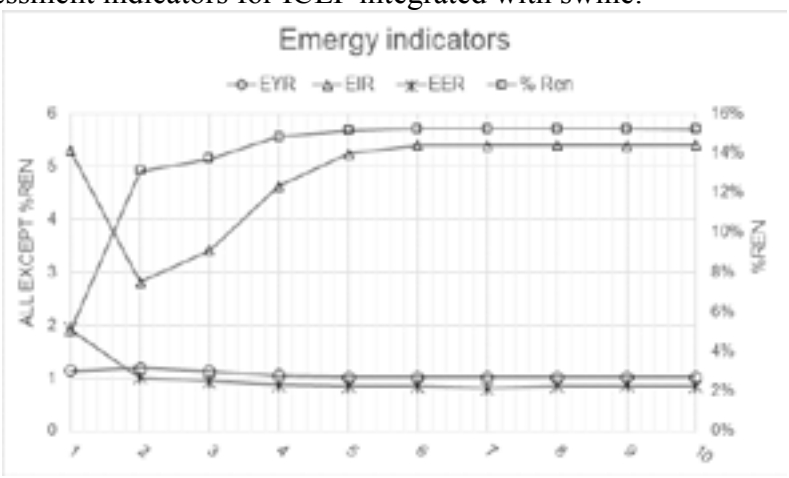
ICLF systems are suitable for cooperative designs that gather small and large farmers. We use an agricultural cooperative in Mato Grosso do Sul state (COOASGO) as an example of ICLF including swine to produce a model of nutrients recycling, stormwater recovery and renewable energy production (electric power). Based on pilot farms studies, in this presentation we show that the upscaling of these technologies to the entire cooperative level can improve environmental and socioeconomic indicators.

Material and Methods

The field experiment was installed in São Gabriel do Oeste, MS, Brazil. Emergy accounting is the sustainability assessment tool that provides environmental and socioeconomic indicators. Based on field and literature data, a similar ICLF (Buller et al., 2014) was redesigned to include solid fertilizer production by means of liquid-solid phase separation of the digester effluent. A mass balance for the overall process considering inputs, storages, outputs and internal nutrient recycling was performed; parameters and variables used in the temporal assessment include changes in soil C stock, GHG emissions, water savings, electric power self-sufficiency (swine manure biodigester) and substitution of part of chemical fertilizer (NPK) imports.

Results and Conclusions

Fig. 1. Emergy assessment indicators for ICLF integrated with swine.



After a 6-year period, the system stabilizes and emergy indicators show a system less dependent on non-renewable resources (%Ren), despite the demand of economic resources (EIR and EYR), and also the trade with the market (EER) is beneficial to the farmers. The mid/long term planning of investments in those technologies can be inclusive for small and large farmers in more distributive cooperative that ultimately favor both the environment and the socioeconomic performances.

References cited

Buller et al. (2014) Agricultural Systems.

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