Abstract of thesis paper

“Process Development for Compost Eluation: Experiments and Modelling”

As a result of the shortage of turf resources and in order to increase the marketing of compost, a process to re-salt compost by eluation is developed. This process allows substituting turf by saltless compost during production according to the standard guidelines for substrate compost.

Recycling of the eluant by the use of a membrane unit and conditioning of the retentate to achieve the quality of liquid fertiliser are the requirements for the process to be applicable and feasible. The development is based on laboratory experiments as well as theoretical approaches and is verified in pilot plant scale. On the basis that a sufficient market share for the produced liquid fertiliser is available, an economic analysis was done. Assuming that the liquid fertiliser can be sold at the targeted quantity, the profit amounts to 2.1 Mio. €/year with a payback time of the initial capital investment 1.5 years.

In the second part of the thesis a unique quasi-stationary mathematical model is developed, which allows the first time to describe the crystallisation and membrane precipitation of a solution of calciumbicarbonate during the continued increase of the concentration in the reverse osmosis.

The model includes a number of parameters, which are partly estimated from measured data or taken from the literature. The experimental data can be described with very high qualitative and quantitative accuracy by fitting the unknown parameters.