PhD project: Olive Tuyishime

Impact of irrigation and drainage management on nitrogen/salt dynamics and rice yield in irrigated Muvumba soils, Rwanda

Accumulation of excess soluble salts in the root zone of irrigated soils is a widespread problem that seriously affects the productivity of crops. This can be effectively managed by salt leaching combined with an adequate drainage system. However, drainage water has been recognised as one the causes of agricultural non-point pollution.

Furthermore, rice paddies are major source of greenhouse gases (GHG). Even though methane rightly dominates discussions of rice GHG emissions, nitrous oxide is also an important GHG. Much research indicates pronounced N_2O losses as a result of midseason drainage and dry-wet episodes in paddy fields.

Considering the problems mention above the aim of this project is to evaluate different irrigation and drainage strategies aimed to manage soil salinity and nitrogen losses in rice production on salt-affected soils of Muvumba Marshlands, Rwanda. Field experiments will be conducted to assess the efficiencies of different water management strategies in reducing drainage outflow, salt content in soil and nitrogen losses. The experiment will entail 12 plots of 8 m x 8 m, arranged in a randomised complete block design. The soil and water salinity will be regularly monitored using electric conductivity probes, while drainage outflow will be measured using HS Flumes and level sensors. A static chamber method will be used to collect gas samples, which will be analysed by a gas chromatograph. Nitrogen concentrations in the crop, soil and drainage water will be determined in the laboratory.DRAINMOD-S and DRAINMOD-N will be used for simulating changes in salt concentrations and N dynamics in paddy rice fields under conventional and controlled drainage systems.