# MODELLING NITROGEN LOSSES UNDER SUGARCANE CROPS USING APSIM-SWIM

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Agricultural management is increasingly needing to take a whole systems approach, in which management decisions are evaluated in terms of impacts on production, profit and the environment. One problem that this approach faces is that some of the system components are difficult or impossible to measure directly. Combining measurement with modelling is therefore becoming an increasingly used methodology. The comprehensive modelling capability that has been developed within the APSIM (Agricultural Production systems SIMulator, (1)) framework is particularly suited to this approach. Recently the soil-water model SWIMv2 (2), which is based on the Richards' and advection-dispersion equations, has been interfaced with APSIM (3). This combination allows a detailed description of the movement of water and solutes in the soil to be combined with other plant, soil and environmental modules available in APSIM. In this poster we show how APSIM-SWIM can be used to examine management strategies that might limit nitrogen losses under sugarcane crops.

## METHODS

The experimental data used in this evaluation come from a field study in Bundaberg, Qld (which is funded in part by SRDC and LWRRDC). The fate of a combined application of N-fertiliser and bromide tracer was monitored by regular soil sampling during the 1992/93 season. Soil hydraulic properties were obtained in the field (hydraulic conductivity near saturation) and using undisturbed soil cores in the lab (water retention curves). APSIM-SWIM was configured to run with a crop module for sugarcane (4) and a soil nitrogen module (SOILN) which incorporates all major nitrogen transformations (5).

## RESULTS AND DISCUSSION

Based on the assumption that nitrate will move in a similar fashion to bromide, the first step of the combined measurement and modelling approach was to validate the transport part of the model using the bromide tracer data. Both the peak position and spread were satisfactorily modelled as a function of time through the growing season. Good agreement between model results and experimental data was also obtained when the nitrogen dynamics were included. These results provided confidence for the second phase in which a number of strategies for managing water and nitrogen fertiliser were evaluated in terms of their impact on crop production and nitrate leaching.

## REFERENCES

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