SUGARCANE YIELD RESPONSE TO NITROGEN RATES AND A NITRIFICATION INHIBITOR FOLLOWING SOYBEAN AND BARE FALLOW

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THE USE OF NITROGEN (N) by the sugarcane industry has come under considerable environmental pressure in recent years. Nitrogen lost in run-off or leaching affects water quality and nitrous oxide emissions from soils contribute to greenhouse gases in the atmosphere.

It is critical that N recommendations allow maximum industry profitability whilst minimising any offsite environmental impacts. To achieve this, a better understanding of the N availability following legume crops, its impact on the optimal N fertiliser application rate and the effects of enhanced efficiency fertilisers is required.

An agronomic experiment was established near Mackay to investigate the optimum N fertiliser application rates following either a bare or soybean fallow. In addition to this the nitrification inhibitor 3,4-dimethylpyrazole phosphate (DMPP), which can potentially reduce losses by retaining N in the ammonium form, was also evaluated.

Soybean biomass was affected by very wet conditions during its growth (Jan–Apr 2010). Due to this, the N contribution from the soybean crop was low at ~ 106 kg N/ha. Wet conditions continued throughout the sugarcane plant crop and affected plant cane yields. It also caused additional crop variability within the trial.

A significant response to N fertilisation was found in both the plant and 1R crops, but was more pronounced in the 1R crop. There was no statistically significant difference in response to applied N in the bare and soybean fallow systems. This was possibly due to the relatively low N contribution from the soybean crop, very high rainfall, and/or large N losses, during the season. These results suggest that following poor legume crops and/or in seasons where conditions promote high N losses following the legume crop, substantial reductions to fertiliser N rates on the following sugarcane crop should be approached with caution.

The application of Urea+DMPP appeared to produce a small increase in both cane and sugar yield. However, these differences were not statistically significant. Urea+DMPP did reduce nitrous oxide emissions from the plant crop in an experiment conducted at the same site.

These results suggest that further work is required on this and other products that may reduce N losses and increase N use efficiency.