

## **Controlled traffic farming: A means to reducing runoff without significantly affecting yield for sugarcane farming systems**

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Controlled traffic farming (CTF) has been advocated by scientists for its potential to improve soil condition, reduce runoff, and maximise farming efficiency all without having a negative effect on crop yield. However, the adoption rate of controlled traffic farming remains low for the sugarcane industry due to the expense of conversion to GPS machinery guidance. The aim of this study was to investigate the effectiveness of matching row spacing to machinery wheel spacing, as a basic and more affordable subset of CTF, in reducing runoff and sediment loss whilst not impacting sugarcane yield. This field trial was conducted on a Vertosol (cracking clay) over a three year period (2009 to 2012) at a block located west of Mackay (21° 11' 3"S 148° 58' 7"E), Queensland, Australia. The block was split into two treatments with treatment 1 having the conventional row spacing (1.5m row spacing and 1.8m wheel spacing) and treatment 2 having row spacing aligned with machinery wheel spacing (1.8m controlled traffic – not all machinery on GPS guidance). Runoff discharge from each treatment was measured using San Dimas flumes and Campbell Scientific pressure transducers, and sampled for sediment concentration.

During the study the onset of runoff was delayed on average by 17 minutes for the controlled traffic treatment (1.8m row spacing), had an average 183 mm/year (14.5%) less runoff, and an 18% lower average peak runoff rate than the conventional treatment (1.5m row spacing). The average sediment concentration was very similar between treatments: 307 mg/L for the conventional treatment and 301 mg/L for the controlled traffic treatment, and given the reduced runoff, sediment loss was less from the controlled traffic treatment. This indicated controlled traffic reduced compaction and improved infiltration rates which ultimately reduced runoff and subsequent sediment loss. On average cane yield was 7% lower with the controlled traffic treatment and had a slightly lower (1.35%) sugar content, leading to a 10% lower sugar yield than the conventional treatment. However, the controlled traffic treatment had 41% less nitrogen applied and resulted in similar basic net return (only including nutrient, herbicide and harvesting costs) between the treatments.

The results from the study suggest cane yields will not be significantly affected by farmers using wider row spacing (1.8m) to match the machinery wheel spacing. As such, sugarcane farmers can have increased confidence that adopting controlled traffic farming will provide both improved environmental outcomes without negatively affecting productivity.

