Sugar Research Australia

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Booklet

Controlled traffic farming systems

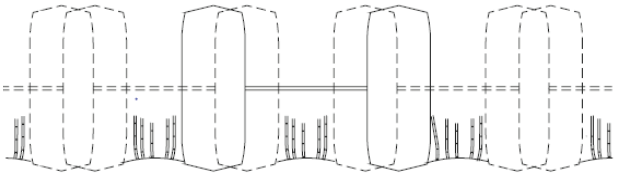
In recent years sugarcane growers have made a move to controlled traffic farming. This move has been necessary as traditionally sugarcane has been grown on 1.5 m row spacing.

Cane is harvested one row at a time with all harvesting equipment passing over each row. Harvesting equipment has a wheel or track spacing of 1.83 m to 1.88 m which is not matched to the traditional row spacing.

The need for change

This mismatch of wheel to row spacing leads to a large area of the field being compacted during the harvesting operation by heavy harvesting equipment. Due to high summer rainfall in many cane growing areas, fields are often wet when harvested leading to perfect conditions for soil compaction.

Harvesting traffic is mostly unconstrained and GPS is rarely used for navigation. The mismatch of wheel spacing plus unconstrained traffic can result in 80 per cent of the field being trafficked and compacted.



1.5 metre row spacing

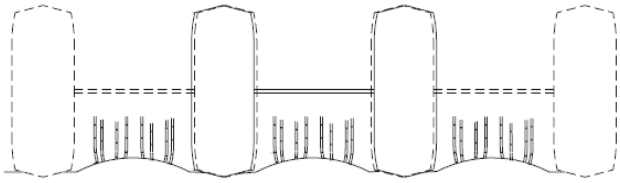
1.83 metre harvester/haulout track width

The area compacted from 1.83 m wide harvester with 600 mm wide tyre in 1.5 m rows is **66 per cent**.

The Improved Farming System

Recommendations to move to a control traffic farming system are part of the larger change process to create an Improved Farming System. The new system is based on controlled-traffic with fallow legumes, green trash blanketing and reduced tillage.

Controlled traffic farming (CTF) is a farming system built on permanent wheel tracks where the crop zone and traffic lanes are permanently separated. It can improve profitability and sustainability, and the adoption of controlled traffic need not be a daunting proposition.



Dual rows (500 mm) at 1.8 metre row spacing

1.83 metre harvester/haulout track width

The area compacted from 1.83 m wide harvester with 600 mm wide tyre in 1.8 m rows is **33 per cent**.

CTF systems in the sugarcane industry are commonly based on row spacings of 1.8 to 1.9 m as these row widths which best suit the currently available harvesting equipment. The row spacing chosen should be one where all of the equipment (tractors, sprayers, harvester and haulouts) used in the farming system can be accommodated.

Crop yields

The CTF system has some flexibility with single row crops on 1.5 to 1.8 m row spacing producing similar yields. Dual row crops where two rows are planted 500 mm apart have been found to produce good yield with row spacing from 1.8 to 2 m. This crop flexibility allows the farm operator to choose a row spacing between 1.5 and 2 m that is suitable to all equipment.

In CTF there are two management zones: the wheel tracks and the crop growth zone. The wheel tracks should be hard and dry to give traction and access after rain to provide operational timeliness. The wheel tracks should also be as narrow as possible to maximise the crop area. The crop zone should have soft, uncompacted soil for plant establishment and root growth. The crop zone should be as large as possible.

The use of CTF also supports reduced/zonal tillage well because guidance makes spraying more straightforward and efficient. Reduced tillage can lead to improved water infiltration, ground cover and soil health. Reduced tillage also reduces input cost and improves whole-of-system profitability.

Results of trials harvested by growers using a controlled traffic farming system

To evaluate the benefits of controlled traffic growers established 13 row spacing trials. Eleven of these trials had cane planted on the conventional 1.5 m row spacing as well as 1.8 m single and or 1.8 m dual rows. In the other two trials a comparison was made between 1.8 m single and 1.8 m dual rows. Ten of these trials were also harvested as first ratoon and two as second ratoon.

Table 1: Cane yield from various row spacing harvested as plant cane.

Crop class	1.5 m single	PRS	1.8 m single	PRS	1.8 m dual	PRS
P	140	13.7	117	13.7	142	13.6
P			139	15.8	133	15.9
P	101				118	
P	65	12.3			72	12.7
P	128	14.5			133	14.2
P	141	15.4	136	15.4	139	14.7
P	120				130	
P	140				141	
P	117	14.8	120	15.2		
P	97	13.3	78	12.9		
P	113	13.5	109	13.1		
P	135	17.3			129	16.3
P			128.7	15.5	111.2	15.83
Average 1	**121**	**14.1**	**118**	**14.5**		
Average 2	**121**	**14.7**			**126**	**14.3**

Average 1: Only the 1.5 m singles with a corresponding 1.8 m single were averaged.

Average 2: Only the 1.5 m singles with a corresponding 1.8 m dual were averaged.

Table 2: Cane yield from various row spacings harvested as ratoon cane.

Crop class	1.5 m single	PRS	1.8 m single	PRS	1.8 m dual	PRS
1	166				160	
1	88	13			98	13.6
1	103	16	113	15.6		
2	105	16	108	15.4		
3	99	14.9	108	14.1		
1	121	15	123	15	124	14.4
2	104	14.4	108	14.4	110	14.1
1	128		132			
1	107	14.4			103	14.5
1	107	14.4			103	15
1	82	14.5			75	14.5
1	93	15.3			98	15.3
1	94	15.8			100	15.5
Average 1	**110**	**15.3**	**115**	**14.9**		
Average 2	**107**	**14.6**			**108**	**14.6**

Average 1: Only the 1.5 m singles with a corresponding 1.8 m single were averaged.

Average 2: Only the 1.5 m singles with a corresponding 1.8 m dual were averaged.

Statistical analysis of trial results showed no significant difference between yields or CCS for any of the treatments. This research shows that growers can increase row width to 1.8 m with either a single or dual row and suffer no yield loss. The move to 1.8 m allows a controlled traffic farming system to be adopted.

Key points

- Controlled traffic row spacing of 1.8 m has no negative impact on crop yields.
- Controlled traffic farming systems reduce the area of compacted soil from 66 per cent to 33 per cent.
- Controlled traffic can deliver unique operating efficiencies and agronomic opportunities.
- Controlled traffic crop have similar yield to conventional planted crops but with lower input cost.