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SRDC Grower Group Innovation Project final report Develop and assess adaptability of different row spacings for harvester fronts

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SRDC GROWER GROUP INNOVATION PROJECT

Develop and Assess Adaptability of different row spacings for harvester fronts

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FUNDING STATEMENT

This project was conducted by Advance Burdekin Collective Research Inc (ABC) in association with the Sugar Research and Development Corporation (SRDC). SRDC invests funds for sugar R & D derived from the sugar industry and the Australian Government.

ABC is not a partner, joint venturer, employee or agent of SRDC and has no authority to legally bind SRDC, in any publication of substantive details or results of this Project.

General Disclaimer

Information contained in this report is provided as general advice only and does contain opinions and assumptions by the author.

Advance Burdekin Collective Research Inc which has primary membership of Burdekin based innovative farmers has taken all reasonable steps to ensure that information contained in this report is accurate at the time of production and opinions expressed are based on the experience of the author at the time of the trials.

Readers should ensure that they make appropriate inquiries to determine whether further up to date information is available on this particular concept.
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Appendix 1 – Australian Canegrower - Article

Appendix 2 - BSES Bulletin - Article

Appendix 3 - BSES Trial Report
Acknowledgements

Local Paper – Advocate – paper articles and also in the “Burdekin Grower”.

Australian Cane Grower - Article

SRDC – Funding provided for this Harvester Group Project
Executive Summary

Cutting different row widths is a piece of cake this season for a Home Hill cane harvester contractor.

This project allowed an easy change of harvester front’s widths by the pull of a lever from 1.52m to 1.83m rows, which eliminates the headache of cutting different row spacing on the farms in this group.

A change to BSES spirals were also a part of this project - this in conjunction with hydraulically adjustable rams created a robust and easy to operate system to meet all the requirements of the project.

The outcome has paved the way to improve adoption of a new farming system, which incorporates minimum tillage, controlled traffic, 1.83m row spacing and reduced inputs to maximize the triple bottom line.
Background

The applicants Martin Walsh and Joe Linton (cane farmers) and members of Advance Burdekin Collective research Inc, were working together with the harvesting contractor, Trevor Pardon, to improve adoption opportunities of a new farming system which incorporates minimum tillage, controlled traffic, 1.83 metres dual rows and reduced inputs to maximize the triple bottom line as suggested by the Yield decline Joint Venture Program. These farmers were the only farmers adopting the new farming system in the Inkerman Mill growing area.

Funding for this project was applied for because of identified constraints that have been hindering the adoption of changed row spacing from 1.5m to 1.83m and also incorporating dual rows.

Dual rows spaced 500mm apart were not able to be harvestered confidently because of the wide profile of each row. Even though the wheel track of the harvester was being matched by having rows at 1.83m, the fronts were specifically built to fit the small narrow hill profile of 1.5m single rows.

Because these two farmers had adopted recommendations of the Sugar Yield Decline Joint Venture Project, which identified wheel track and row spacing mismatch and related compaction as an impedance to production, there was a need to optimize the harvester to the new system.

As the rest of the harvester group members were not prepared to change at that time, there needed to be an easy method of harvester fronts adjustment to accommodate both systems. Otherwise the harvestering contractor would not conform to best management practice in both systems.
Aims

As the applicants have been trying to adopt and evaluate the new system for seven years a number of constraints have been identified. One of the most important constraints is the miss match of existing harvester fronts to conform to the new row shape and spacing of 1.83 metres. Added to the dilemma is most of the harvesting group is still using row spacing of 1.5 metres.

These constraints have created resistance from other farmers to adopt the new row spacing. Added to this issue are the unknown advantages that can be realized after trials have been assessed by using a new BSES fronts combined with easy movability to conform to both row widths.

There are only a few other farmers or harvester operators trialling the proposed system in the entire Inkerman Mill growing area of 1.8 million tonnes. There was much interest in the idea and many questions were being asked constantly but without the obvious constrains being addressed no adoption had been suggested. To put it plainly until we ironed out the bugs no adoption was going to happen in this area. This industry has a resistance to change. We believed that by providing a visual opportunity to other groups in this area wider adoption will occur.

Wider profile of dual row 1.83m was not ideal for the current harvester fronts. It was identified that a harvester set up to cut 1.5m single rows did not do a good job harvestering 1.83m dual row, there needed to be changes made that would accommodate the new system but still be able to adjust to the old system of 1.5m single row.
The critical aim was to design the fronts to fit wider rows and to be able to hug the sides of wider rows to efficiently clear the paddock (picking up all cane sticks and driving straight down the drill instead of wandering from side to side of the drill which defeats the purpose of reducing compaction in the new system).

The second aim was to convert to the new BSES design fronts to further improve the harvesting job.

The third aim was to make it adjustable to fit both old and new systems.

Completed BSES adjustable fronts with a standard front behind.
Methodology

This project has been carried out by the following process:

1. EHS Engineering was commissioned to manufacture after market BSES style Front Auger System. This was made in the early part of 2006 that completed Milestone 1 and held at EHS until plans and parts were manufactured to provide ram operated adjustable components to fit the BSES fronts to the contractor's harvester (T. Pardon).

2. After a long process of development of auto-cad drafting was finalized, the harvester was transported to EHS workshop for installation. This was achieved just in time for the start of the harvest season. Trevor Pardon assisted EHS throughout the installation and helped to transport the harvester back to this area ready to start work.

3. After a few teething problems were over come the harvester performed well with the altered fronts. Workmanship and design was of high standard and the ram adjustable system was considered robust and had no maintenance problems throughout the season. The harvester cut in excess of 40,000 tons with the altered fronts that season and the following season to date and we can see no reason why it will not continue to perform well for the rest of its harvesting life.

4. BSES carried out comparison trials between 1.5-metre row and 1.83-metre row during the season. The total criteria of the trials were not carried out because of the delay from last season to this season. No data could be obtained to provide differences from the old fronts to the new fronts in the same paddock. Due to the delay in manufacture of the new fronts, EM data was not collected because there was no comparison available.
Results and Outputs

The project set out to develop adjustable harvester fronts that would work in both 1.5m and 1.83m row spacing and profile.

During the first few years of planting cane at 1.83m and dual rows at 500mm apart on the bed, problems were encountered with the standard fronts on the harvester. The sidewalls and floating shoes were too narrow to allow the extra bulk of cane to pass through without a bulldozing effect. This resulted in 6 outcomes.

- Cane was literally being torn from the ground
- The harvester was difficult to hold straight over the rows of cane
- The standard harvester fronts were being spread apart from the pressure of wide rows
- Heavier loads were encountered on the drive train
- Cane stool that had been torn out of the ground created more soil in the bin
- Poor ratooning was the end result

This was causing concerns with both the contractor and the farmer and nearly ended the new farming system approach on the farm and certainly provided other farmers reasons not to adopt the new row width of 1.8m rows.

The only way to fix this problem was to widen the sidewalls and floating shoes of the harvester fronts but because other farmers had not changed from 1.5m single row, widening of the fronts could not be permanent. So the fronts needed to be adjustable.
Research was conducted by members of Advance Burdekin Collective Inc, talking to other harvester owners who had modified their fronts for the new wider row spacing. The shortcoming of these was they had a manual system of sliding the fronts wider. This required a large period of time and physical effort to change. This was not acceptable. The change from 1.5m to 1.83m needed to be simple and easy. The ram system was developed.

The cost of the new system was excessive but achieved the results required which was being able to move from paddock without large time delays. In the present form the fronts can be adjusted by a push of a handle in less than one minute.

The results were very positive:
- As stated by the contractor the harvester was able to follow the wider row and drive straight, the ground job was improved, less area was being compacted, less load on the harvester power train, less soil in the bin and cane ratooning was much improved.
BSES trials conducted on the new fronts showed that the new BSES fronts in 2006 produced nearly 50% more cane per hour than did the standard fronts in an evaluation in 2005 in similar size crop. Comparisons were conducted between 1.5, single row and 1.83m dual rows on different farms. Harvester results stated in the BSES Report were similar in both paddocks but the 1.5m row crop was mainly standing while the 1.83m rows were lodged. In both trial paddocks, which included 1.5m and 1.83m row spacing, the harvester cut between 1.83 and 1.94 tonnes per litre of diesel. The elevator pour rate was 15 tonnes per hour higher in the 1.83m rows. As stated in the BSES Report the billet quality was less due to shorter billet length in the 1.83m system. This could be a result of lodged cane and/or harvester operator controlled machine settings. Further detail can be found in the BSES trial report attached.

The new BSES fronts proved their worth in the trials. The harvester operator has stated that the machine performs better and is easier to drive now and has promoted this to other harvester owners.

A number of adjustable harvester fronts have now been installed by EHS showing adoption by other industry participants and adoption could be further improved if the cost of conversion was less.
Capacity Building

This project was a great success and achieved all it set out to do.

Delays in manufacture created a blow out in costs. This has caused concerns with the group, as SRDC funding did not cover the blow out.

It was a learning experience for all members of the group in that it highlighted the need to have quotes as much as possible and to determine future ownership of the hardware components.

Consideration will be given to these issues in future applications.

The decision to use BSES to do independent trials was correct and eased the burden of many volunteer hours on ABC group members for the project.

Ultimately the project has shown that farmers & contractors can come together to improve their farming systems and minimize costs of Research & Development by self-help, determination and funding from SRDC.

Outcomes

All sections of the project achieved its goals.

1. Change to BSES augers for improved feeding of cane
2. Adjustable by ram operation to match both 1.5m and 1.83m rows and hill profile
3. Publications in Australian Canegrower, BSES Bulletin
4. Other harvester operators have purchased the adjustable rams for their group
5. This project also set out to make it easy for farmers to adopt different row spacing without the concern of harvester mismatch during the transition period
6. Harvester operator is much happier and less stressed using the adjustable fronts
7. Numerous enquiries about the adjustable fronts are continuing with much interest.

This all equates to creating better and easier adoption of new wider row farming system.
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BSES new adjustable fronts

Old standard fronts
Environmental Impact

The environmental benefits will be the facilitation of adoption of the new farming system, which will offer a reduction in impacts on the environment. After assessment probably adoption of the proposed project could enhance the transfer from a burnt cane system, which is widely used in this area over to a green trash blanket system. The new fronts should reduce fuel use; improve cane quality by less dirt being transported to the mill and obviously less need to return that dirt to the paddock. The new fronts will enhance ratoon ability thus keeping a better cover on the ground, which will reduce erosion, potential.

Also as identified by SYDJV soil health will improve which will improve water-holding capacity and will also reduce the need for cultivation thus reducing diesel consumption and green house has emissions.
Communication and Adoption of Outputs

BSES Bulletin – An article was placed in the Bulletin to show the experiences of the project participants and their views.

Australian Canegrower – Australian Canegrower was also used to promote the project and its outcome.

Farm visits – there has been a continual line of visitors to the paddock operations to see the end result. Comments ranged from nit picking negative ones to “Great idea, looks good and easy to adjust.”

Flyers to farmers – Flyers were also given to farmers who attended other project workshops who ultimately visited our project.
Recommendations

The author recommends this modification to any harvester group, which has farmers on both row spacing or in transition from 1.5m to 1.83m spacing.

In the trials BSES fronts proved to be superior with higher flow rate per hour than the standard fronts.

The adjustable ram system is easy to operate and is robust in construction. It has now harvested 2 seasons, 85,000 tonnes with no maintenance required.

Ratoon crops are now better.

The harvester operator can and does change the width of the fronts in every paddock because of the ease and short time to adjust and is less stressed by different row spacing.

The cost of installation by a manufacturer is high and could be improved by self-installation but the system is worth considering because of the benefits.