

SRDC Grower Group Innovation Project

Final Report

SRDC project number: GGP 038

Project title: Improving Billet Planter Efficiency

Group name: North Clarence Innovative Planting Group

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Funding Statement:

This project was conducted by North Clarence Innovative Planting Group 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.



Australian Government
Sugar Research and
Development Corporation

The North Clarence Innovative Planting Group 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.

Body of Report

Executive Summary:

The aim of North Clarence Innovative Planting Group was to produce an efficient billet planter for a dual row cane system that provided minimal working hours and labour, thus reducing costs, and having minimal impact on the farming environment. Consequently this will increase profit margins. The dual row billet planter was to be compared to the conventional method of a Hodge dual row planter.

The design concept was based around building a unit that was self propelled, compact, and required minimal working labour. Design materials sourced were to be recycled to reduce cost. Materials were sourced locally and interstate with approximately 60 % of the design being recycled materials, parts or machinery.

The trial site was chosen for consistency of soil type and drainage. Northern New South Wales do not irrigate fields therefore watering was achieved through rainfall.

The plantings were completed the same day with both dual row cane planters planting identical cane variety in the trial site. Planting of the trial was completed within several hours with all aspects of planting identical between the two planting machines i.e row spacing, planting depth, chemical application and water rate. Both machines were fitted with Global Positioning Systems to eliminate human error providing precision and accuracy within the cane rows.

During the planting process, the self propelled unit revealed to be more user friendly than the conventional dual row planter. As it was shorter in length, it had a smaller turning circle, which was more beneficial within the trial site headlands. Being shorter also allowed easier inspection and monitoring of the working machine. This monitoring process was also aided with rearward facing cameras.

The design provided greater carrying capacity of cane billets within the holding bin which consequently provided longer planting times and less refilling. Therefore saving time and fuel consumption.

In comparison to the conventional dual row planter, collected data of planting rates, eye count, set placement and billet feeding/metering/delivery were similar between the two machines, concluding that there is no vast difference in planting success; i.e strike rate and/or set placement.

In comparison of finances of the two machines, a total of \$65,506.43 (inc GST) was spent in constructing the project. Current prices of a conventional dual row Hodge cane planter alone, are, (at time of printing) \$74,000 (inc GST). This consequently requires a tractor to pull the machine. This values the unit to an estimated total of \$175,00 (pending on the make and model of the tractor), thus making a difference of approximately \$100,000 between the two units.

Background:

The motivation behind the North Clarence Innovative Group was to allow a farmer the control, comfort and ease of the planting process. Current methods of billet planting within the Clarence region, require two personnel for operation of most planting machines. One drives and the other is the planter operator. This is a job that is often undesirable as it requires the planter operator to be exposed to the elements of dust, wind, sun and chemical exposure. It also places the planter operator in a dangerous position of not being enclosed safely within the moving planter thus creating Occupational Health and Safety hazards. The self propelled dual row cane planter was to address all these issues and provide a safe, comfortable, productive, and user friendly planting system.

Aims:

- Increase adoption of controlled traffic systems in the North Clarence Harvesting Cooperative
- Reduce planting costs in controlled traffic/zero tillage systems
- Increase controlled traffic planting efficiency
- Improve billet feeding mechanism of planter to provide a more even and precise flow of billets
- Design, construct, and commission a dual row billet planter that has an increased billet carrying capacity and improved billet metering system
- Extend and demonstrate the innovative planter concept to other industry groups.

Methodology:

An initial workshop was organized to obtain industry input into the proposed design which involved growers, agricultural engineers and agricultural staff from the New South Wales industry. The workshop also involved growers from the New South Wales Farming Systems Group which provided input into the design of the planter delivery system, desired disc assembly and covering devices. Prior to the workshop a review of the available literature, (eg web search, SRDC funded planter projects), relating to planter conversions and precision billet delivery systems, were undertaken.

The locating and purchasing of the second-hand power haul was Stage Two of the process. This was sourced from Northern New South Wales as excess unused pre-loved stock. Upon decommissioning of the power haul, the elevator and bin were removed from the power haul's body for modification, whilst existing hydraulics, rams, hoses and steel were reused in the construction of the project. The group decided not to purchase a double disc opening system, (as initially planned), due to higher costs and negative personal experiences with the systems. As an alternative, North Clarence Innovative Planting Group unanimously decided to purchase steel and make six inch mole boards instead. Depth wheels, pivot points and many miscellaneous parts were taken from unused machinery and recycled into the planter. The elevator was also modified by changing the angles and length and the holding bin was reduced in size to accommodate the billet metering system. Additionally, the chassis was modified in breadth and width to accommodate a greater weight and withstand pressures of the working planter. It is estimated that over 80 percent of the self propelled dual row cane planter is made from recycled parts.

Upon commissioning of the planter, the trial site was chosen and an existing contracting John Deere dual row planter was chosen for the comparison; (a regular contractor used on the property). Both machines planted identical varieties with all application rates of chemical, water and fertilizer the same. After the plantings were completed, trial methods and data collection were compiled by Mr Robert Aitken, Extension Officer BSES Harwood. Mr Aitken completed shute count and millable stalk count, a gap analysis consisting of a 10 metre row count, a viable eye count and investigated a more accurate planting rate.

Due to a biannual cycle of sugarcane in Northern New South Wales, at time of printing a comparison of a mature crop was not available. As a substitute, Mr Robert Aitken undertook a 'Biomass Sampling' where inspection, sampling and records were completed from a 10 metre cane row from each planter (please refer to chart in outputs/results). Mr Aitken came to the conclusion that there was no significant difference in yield between the two planters.





Results/Outputs:

Metering System (October 2008)

Conventional John Deer Dual Row
Planter

Converted Power Haul Dual Row Planter

Dig One (1)

Eye Count	24/20	21/22
Total Eyes	44	43
Billet Weight	3.7kg	3.4kg
Planting Rate/per acre	3.7 tonne	3.4 tonne

Dig Two (2)

Eye Count	21/27	18/25
Total Eyes	48	43
Billet Weight	4.3kg	3.0kg
Planting Rate/ per acre	4.3 tonne	3.0 tonne

Dig Three (3)

Eye Count	28/16	34/23
Total Eyes	44	57
Billet Weight	3.7 kg	4.5 kg
Planting Rate/per acre	3.7 tonne	4.5 tonne

Dig Four (4)

Eye Count	26/23	33/23
Total Eyes	49	56
Billet Weight	3.5kg	4.7
Planting Rate/per acre	3.5 tonne	4.7 tonne

Dig Five (5)

Eye Count	33/18	28/23
Total Eyes	51	51
Billet Weight	4.0 kg	3.7kg
Planting Rate/per acre	4 tonne	3.7 tonne

AVERAGE

Eye Count	-/-	-/-
Total Eyes	47 (rounded down)	40 (rounded down)
Billet Weight	3.84kg	3.86 kg
Planting Rate/per acre	3.84 tonne	3.86 tonne

Biomass sampling (stalks+tops) 28th August 2009 Block 3810 Farm 1141 Q203

Planter	Millable Stalks per 10m dual row bed	Weight of 20 stalks (kg)	Wt of stalks kg per 10m	Cane yield tonnes/ha	Average yield tonnes/ha	Average yield tonnes/acre
S. Causley rep 1	186	19.7	183	102	104	42
S. Causley rep 2	182	21.2	193	107		
Powerhaul rep 1	161	21.1	170	94	106	43
Powerhaul rep 2	196	21.5	211	117		

*Chart compiled and provided by Mr
Robert Aitken Harwood BSES
Extension Officer, New South
Wales*

Statistical analysis showed no significant difference in yield between planters.

During the construction phase, a field day was held in conjunction with the BSES (Harwood), bus trip. This enabled many local farmers to observe the planter in construction and provide constructive criticism, feedback and general knowledge towards the construction of the planter. Present at the field day were cane growers of varying age, education, work skills and experience, thus providing a broad and valuable source of information, advice and encouragement. All concerns of impending problems were discussed and solutions provided. In conclusion of the day, an evaluation was completed by some of the group members and new strategies and varied work plan were implemented as a result.

Upon completion, and due to high demand of interest of project results, an additional field day was organised with Harwood BSES Extension Officer, Mr Robert Aitken. Chris Shannon provided a detailed presentation to the fifty cane growers on the successful commissioning of the planter. Results were provided by way of observation and discussion of the trials.

Chris also attended the 2009 Grower Innovation Virtual Expo (G.I.V.E). Alongside many innovative growers, Chris presented his project and findings via a Power Point presentation. (please review CD for further information).

Intellectual Property and Confidentiality:

(Nil)

Capacity Building

North Clarence Innovative Planting Group has been successful in completing a project together. It has allowed the innovation, creativity, and desire for change to be achieved through group support and knowledge. The combination of knowledge of many cane growers and the desire for innovation and change has proven to be a significant influencing factor in the grower group's capacity for success at all levels.

Most members of the group are now confident to complete research and development, and/or implement enhanced farming systems through their own needs or desire without the dependence on other innovators.

Outcomes:

Economic Benefits achieved

- Labour reduction (one man operation)
- Precise row width (Global Positioning System)
- Reduction in fuel consumption (less refilling of billet bin)
- Reduction in maintenance (less moving parts)
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Social Benefits achieved

- Building capacity of grower group members in building a self propelled billet planter
- Reduction of labour required
- Technological advancement in the sugar industry (first self propelled dual row cane planter)
- Professional development of each individual member
- Increased leisure time
- Reduction in stress levels during the planting season

Occupational Health and Safety issues addressed

- Significant increase in planter operator's safety (operator no longer required to ride upon moving machine).
- Significant decrease in planter operator's exposure to elements (chemical, sun, dust, wind)

The safety of the planter operator was initially not a key area of concern. The project was initiated mainly for the planter operator to be more comfortable whilst working. Upon commissioning of the machine, it was noted that the safety of the planter operator had been significantly increased. As stated, this was not an assumed finding but it is an extremely important issue to address in regards to the current emphasis on workplace safety and addressing Occupational Health and Safety issues for workers.

Environmental Impact:

Environmental Benefits achieved

- Reduced cultivation (minimal tillage capabilities)
- Recycling of used cane haulage vehicle and machinery
- Reduction of fuel used (less refilling of billet bin)
- Reduction of spray drift (select positioning of spray jets within enclosed shute system)
- Reduction of soil compaction (use of four high flotation tyres)

Communication and Adoption of Outputs:

Effective communication was not a problem as the Clarence region is quite small in comparison to North Queensland farming regions, therefore 'word of mouth' is a fast form of communication. This was evident when Chris Shannon received numerous phone calls in regards to the project from cane growers in which Chris gave dates of field days to attend and organised private viewing and explanation of the project.

The participation in the BSES Field Days were successful tools of communication. This allowed informal discussions to take place and hands-on investigation was valuable. As many more cane growers in the region are slowly adopting new farming systems (i.e. dual row planting of 1.8 metre centres); designing and commissioning a machine was more of a tangible product that cane growers can physically see and not simply read on paper or hear in theory. Considering that a large percentage of cane growers in the Clarence region are over 50, these cane growers are of a 'hands-on' generation and need to see theories put into practice and observe the tangible product. Additionally, the informal yet informative nature of a Field Day provided a less intimidating atmosphere for cane growers who are less likely to attend more formal and 'theory-based' meetings. This made the field days highly successful with all participants leaving the days with greater knowledge of the new farming practice, and seeing an improvement in planting technology.

During the Field Days and G.I.V.E Expo, SRDC were acknowledged as the main funding entity for the project. North Clarence Innovative Planting Group also received valuable support and feedback from Mr Joe Muscat (SRDC project manager), throughout the project.

Recommendations:

(Nil).

Publications:

(Nil)