SHORT, NON-REFEREED PAPER

BACK TO BASICS: A DECISION SUPPORT TOOL TO IMPROVE SUGARCANE GROWER SUSTAINABILITY

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Abstract

South African sugarcane growers have experienced a gross margin squeeze over the past decade, mainly due to above-inflation input cost increases. Simultaneously, cane yields have declined. With limited vertical expansion potential in the value chain, grower focus has been on streamlining input costs. However, there is potential for sugarcane growers to increase their revenue by improving on farm efficiencies. To achieve this, the grower must prioritise opportunities and implement effective changes. This paper focuses on highlighting the potential grower quantifiable gains, using the '*Back to Basics'* decision support tool. SA Canegrowers, with assistance from SASRI extension on the south coast, developed the Microsoft Excel® based model, which quantifies the benefit of improving 15 on-farm operational activities. Some of these activities include topping height, base cutting, harvest-to-crush-delays, ripening, timing of herbicide application, bundle size, and increased average harvest age. SASRI reported research results are used to determine the conservative potential gains for each activity, which is then converted into monetary terms using the current season RV price. The potential gains for each grower will differ due to economies of scale, as well as varying agronomic and environmental conditions. To consider these differences, the model requires that an individual grower input different farm variables. These include, among others, farm harvest area, cane yield, RV%, planting costs, and harvest costs. A summary table at the end of the model highlights the estimated potential monetary gains that can be attained, if the activity is successfully implemented.

Keywords: sugarcane, economics, decision support tool, growers, efficiency, South Africa.

Introduction

South African sugarcane growers have experienced a gross margin squeeze over the past decade, mainly due to above inflation input cost increases (Nicholson and Kadwa, 2017). Simultaneously, cane yields have declined (SACGA, 2017). With limited vertical expansion potential in the value chain, grower focus has largely been on streamlining input costs (Nicholson and Kadwa, 2017). However, there is also potential for sugarcane growers to increase their revenue by improving on farm efficiencies (BFAP, 2014). To achieve this, the grower must prioritise opportunities and implement effective changes (Poggio *et al.*, 2016)

This paper focuses on highlighting potential grower quantifiable gains, using the *Back to Basics* decision support tool.

Methodology

South African Cane Growers' Association (SACGA), with assistance from the South African Sugarcane Research Institute (SASRI) extension on the south coast, developed the Microsoft Excel® based *Back to Basics* model, which quantifies the benefit of improving 15 on-farm operational activities. The items included were chosen according to where improvements could be quantified with relative ease. Where available, previously reported research results were used to determine the conservative potential gains for each item, which were then converted into monetary terms using the current season RV price.

Table 1. Fifteen items included in the model, based on previous research, if applicable.

	Name of item	Cited literature
1	Effective topping height	Staub, 1955; Mann, 1980; Inman-Bamber and Wood, 1987
2	Ensure labour tasked correctly	SASRI, 2016.
3	Improve base cutting	Staub, 1955; Mann, 1980; Inman-Bamber and Wood, 1987.
4	Reduce underloading	-
5	Increase in bundle size	SASRI, 2017.
6	Manage diesel more efficiently	SACGA, 2016; Nicholson and Kadwa, 2017.
7	Settlement discount for chemical and fertiliser	SACGA, 2015.
8	Negotiate lower price on fertiliser and transport	SACGA, 2015.
9	Reduce harvest to crush delay	Wood and Du Toit, 1972; Harris, 2017
10	Ripening - early or late season	Van Heerden *et al.* 2014 Ngxaliwe and Van Heerden, 2015; Kadwa and Small, 2018.
11	Correct timing of fertiliser application	Buchanan and Irons, 1997; Jones and Singels, 2005.
12	Correct timing of herbicide application	Buchanan and Irons, 1997; Jones and Singels, 2005.
13	Age cane by one month	Jones and Singels, 2005; SACGA, 2015; Ducasse *et al.*, 2017.
14	Eldana control, age cane by four months	Jones and Singels, 2015; SACGA, 2015; Ducasse *et al.*, 2017.
15	Trashing	Thomson, 1965; Van Antwerpen *et al.* 2001; Van Antwerpen *et al.* 2006.

The potential gains from each item will differ per grower due to economies of scale, as well as varying agronomic and environmental conditions. Therefore, there is no 'one-size-fits-all' result. To consider these differences, the model requires an individual grower to supply different farm variables. Table 2 shows the section of the Dashboard tab where a grower will enter the farm information. A 6 000 ton farm, on a 12-month cycle is used as an example.

The model was refined and improved by conducting seven workshops with growers on the South Coast. The workshops consisted of a PowerPoint presentation, which was then followed by an interactive discussion with the grower group around the decision support tool and the values used. The model has been distributed to growers for the past two seasons for individual use in their specific environment and situation. Feedback and comments from growers were incorporated to improve the model.

Table 2: *Back to Basics* Model Input Dashboard.
Values in yellow need to be entered by user.

BACK TO BASICS		
Variable inputs		
RV price	**R4 450**	
c Factor	**0.03**	
d Factor	**0.40**	
RV % season forecast	**11.30%**	
Replanting cost/ha	**R26 000**	
Ratoon maintenance cost/ha	**R7 000**	
Harvest, Infield haul and loading costs/ton	**R90**	
Road haulage cost/ton	**R80**	
LOMS (cutting days)	**216**	Days
Farm inputs		
Area under cane (ha) - excl. fallow area	**100**	ha
Tons cane harvested per annum	**6000**	tons
Harvest area per annum (ha)	**100**	ha
Yield - tons/ha/annum	60	ha
Fallow area	**0**	ha
Replant area (ha) - 10% is norm	**10**	ha

Results and Discussion

Table 3 shows an example of the summary output tab of the model, showing the potential gains by adopting each of the items in the *Back to Basics* model. If an item is not selected by a grower, it is blanked out. The values indicated for each item are based on the 6 000 ton farm example, presented in Table 1. These values will differ significantly as the farm size changes. Not all items are applicable to all farms. For example, inland and irrigated farms are unlikely to experience any benefit from ageing cane further. It is clear from the summary total value that there are considerable gains to be made, which could assist in developing the financial sustainability of sugarcane growers.

There are many other items that can potentially be added to the *Back to Basics* model in the future. These include, among others, land use plans, variety adoption, certified seedcane, replant frequency, soil compaction, correct fertiliser and chemical application rates and disease pressure.

The model has shown great promise in making growers aware of better management practices that can improve their financial sustainability. A challenge going forward would be the implementation of suggested actions on an effective and continued basis.

Table 3. *Back to Basics* **model final summary – Estimated potential
gains for the 2017/18 season by improvement of each item.**

	BACK TO BASICS – FINAL SUMMARY TABLE		
	Items identified for improvement	**Total revenue gain**	**Gain per cane ton**
1	Effective topping height (75 mm improvement)	R41 884	R6.98
2	Ensure labour tasked with hand weeding is done correctly (10% improvement)	R17 955	R2.99
3	Improve base cutting (50 mm improvement)	R22 762	R3.79
4	Reduce underloading (1.5 ton payload increase)	R24 000	R4.00
5	Increase in bundle size (1 ton increase)	R39 422	R6.57
6	Reduce diesel wastage (5% reduction)	R10 013	R1.67
7	Settlement discount for chemical and fertiliser (5% discount)	R26 314	R4.39
8	Negotiate lower price on fertiliser and transport (5% discount)	R17 561	R2.93
9	Reduce harvest to crush delay (24hour reduction)	R30 171	R5.03
10	Ripening - early or late season (10% of area sprayed with 1.1% RV increase)	R48 340	R8.06
11	Avoid late fertiliser application (2.5% yield increase)	R75 428	R12.57
12	Avoid late herbicide application (2.5% yield increase)	R75 428	R12.57
13	Age cane by one month (3 tons yield gain and 0.3% RV gain)	R90 032	R15.01
14	Eldana control, age cane by four months (12 ton yield gain, 1.5% increase in RV)	**R236 336**	**R39.39**
15	Trashing (9% yield increase)	-	-
	TOTAL POTENTIAL GAINS	**R755 644**	**R125.94**

Acknowledgements

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