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BEST MANAGEMENT PRACTICE FOR SUGARCANE VARIETIES

by

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EXECUTIVE SUMMARY

This has been both a challenging and rewarding project within the northern sugar industry. Increasing economic pressure in the wet tropics has seen a need to develop and adopt better short- and long-term strategies to increase industry profitability. "What variety do I plant?" This is probably the single most important issue given the least attention by growers. This decision remains in place for a number of crop cycles and subsequent management of these varieties will directly affect farm profitability. Better management of varieties in both a short- and long-term strategy will enable growers to increase their ccs and improve their farm profitability.

Selection and management of varieties is a complex process, which involves more than the yield and ccs of varieties. It involves suitability to soil type, ratoonability, pest and disease issues, ease of planting, herbicide tolerance, ability to withstand harvest under difficult conditions, nutrient requirements, harvesting rosters and many other factors that may override planned decisions such as rainfall.

A grower group process was used to facilitate greater debate of these issues by growers and testing variety best practice on their farms using an on-farm participatory trial program. The full costing of the benefits and consequences of different management options has enhanced growers decisions of "what variety do I plant?" as well as other farming practices.

The strength of this project was that it allowed growers to fully implement and evaluate a range of real variety management options that they have chosen as being best for their situation.

The results from this project have made growers more aware of the consequences when choosing varieties to plant. The presentation of trial results in dollars per hectare has proved very beneficial. A lot of discussion has been generated at group meetings as a result of this information. Growers have appreciated the opportunity to discuss these results with their peers. Growers are more aware now of how important it is to calculate net returns and determine what variety or farm practice is more profitable on their farm.

Information delivered to grower groups as part of this project has provided growers with the skills and knowledge to conduct reliable trials on their farms. Growers should now be able to compare different variety performance and farm management practices on their own farms to meet their individual situations and determine the most profitable practice.

With the ability of growers to better test varieties for their individual situations, varieties released to the industry will have a fairer assessment based on individual needs and profitability rather than broad area recommendations.

Conducting market research into what the industry wanted in the form of variety information through focus groups proved extremely useful. The original project intention was to devise a Variety Best Management Practice (BMP) Manual. However, it was quite clear from these focus groups that a complex manual was not wanted, but information in a simple and concise format was requested.

This project has seen the successful use of group extension to target a large number of growers in the sugar industry. Since the commencement of this program, most northern mills, in conjunction with BSES, have established productivity groups similar to the participatory BMP process. The formation of these groups within mill areas provides an avenue to meet with larger numbers of growers more regularly than could be achieved on a one-to-one basis. This also provides an excellent opportunity for multi-agency input to discuss timely research and farming issues. One-to-one extension is still an important part of extension in the northern sugar industry. However, group extension is fostering greater discussion and exchange of ideas between growers and mill areas. This is extremely important in times of increased economic pressure.

This program has been the starting point of many increases in productivity and profitability in the northern sugar industry, through better management of current varieties and the availability of more information to make variety decisions on individual farms.

1.0 BACKGROUND

Increasing economic pressure in the wet tropics has seen a need to develop and adopt better short- and long-term strategies to increase industry profitability. The longest lasting management decision on a sugarcane farm is "what variety do I plant?" The answer to this question often remains in place for five to six years depending on block rotation. It is probably the single most important issue given the least attention by growers. The subsequent management of these varieties will directly affect farm profitability. Variety selection is not the only important factor, but all other farm management decisions that affect farm profitability are also important.

Better management of varieties in both a short- and long-term strategy will enable growers to increase their ccs and improve their profitability. There are obvious practical on-farm reasons why growers do not implement what information providers believe to be the best variety management options. These reasons may not be related to simple economics and need to be addressed and understood, so that farm profitability can be optimised in terms of variety management.

Selection and management of varieties is a complex process, which involves more than the yield and ccs of varieties. It involves suitability to soil type, ratoonability, pest and disease issues, ease of planting, herbicide tolerance, ability to withstand harvest under difficult conditions, nutrient requirements, harvesting rosters and many others.

The importance of these issues in the management decision making process must be understood so that information provided can be both timely and relevant. A group process will facilitate greater debate by growers of these issues, and full costing of the benefits and consequences of different management options will enhance the resolution of what is the best practice for each situation.

In the short term, management of current varieties so that they are harvested at their known time of optimum financial return will help growers to remain viable. The development of new varieties, through research addressing the low ccs problem, and then their appropriate presentation to growers is a long-term strategy. Presently, grower evaluations of variety management options are often simplistic and untested. Improving growers' skills in evaluating management options will provide benefits in terms of variety management and for other farm husbandry practices.

Historically there has been limited market research undertaken to determine what information growers need, how it is used and the format that they would like variety recommendations delivered in. There has also only been limited participation by growers in the assessment of different management decisions, with the necessary resources and technical support, to enable them to analyse the effects of different management options that they have available to them.

The strength of this project is that it will allow growers to fully implement and evaluate a range of real variety management options that they have chosen as being best for their situation. It will also highlight for providers what information is needed and when it is appropriate. The process will encourage the spread of better on-farm evaluation across the region. The information that is bought together from all the groups will then be able to be used to develop a best management practice variety package that can be adapted for the whole industry.

This project primarily focused on what growers can do now to better manage their current varieties and therefore remain profitable while medium- to long-term projects are developed.

By developing a best practice variety management information package in consultation with growers and millers, the use of current varieties should be enhanced. Researchers will also benefit by understanding what are some of the important considerations involved in the practical, on-farm selection and management of varieties.

2.0 OBJECTIVES

The objectives of the project were to:

- improve grower management of varieties to increase profitability and maximise ccs, and to present full costings for each management option tested;
- facilitate grower testing and costing of variety best management practices on-farm;
- identify the variety management issues that are important to all sectors of the industry (growing, harvesting, milling and research);
- identify the factors that limit grower adoption of the best practice recommendations and determine how these can be addressed.

These objectives have been met through grower groups and an on-farm participatory trial program.

3.0 METHODS

The project was designed to work with grower groups from Tully to Mossman. The groups were established primarily to conduct on-farm participatory trials. They were also designed to give feedback on the type of information needed and the format growers require when making variety management decisions. A group was established in each mill area from Tully to Mossman with the inclusion of an extension officer from each area. Cane Protection and Productivity Board (CPPB) staff also regularly attended group activities.

Participants within the groups established trials to test variety management options identified as important issues. The groups were provided with technical and economic analysis support through BSES, other agencies and consultants, to enable them to capture all the costs and consequences of the management decisions made.

The groups decided what was the likely best variety management practice for their situation and selected one or two options to test against. The on-farm trials were large strip trials, with a minimum of two replicates that enabled commercial harvesting to obtain mill ccs and actual harvest weights. Blocks selected for trials were uniform in soil type and drainage.

The groups were provided with assistance in collecting the data required throughout the growth of the crop, the coordination of the harvesting, and the collection and analysis of the data. The information collection and technical support were available to all grower groups on a demand basis.

All trial information was fed back to the groups for the planning and management of subsequent crops and further trials during the life of the project. The groups were also presented with components of the information package to assist them in developing a robust decision support system or package that would be in a format the grower groups requested as well as having ownership of.

Groups were also used to identify what motivates growers when selecting and managing varieties. Any other issues or motivators that may not be directly linked to variety management *per se* were discussed because they may have a direct impact on variety performance. An independent facilitator was used to explore the issues without any local bias.

The milling and harvesting sectors and research providers were also consulted so that their requirements and thoughts could be used in the trials and in the development of a new variety management package. This enabled a two-way transfer of information and requirements between all the groups that had a stake in the development and management of varieties.

As a part of the extension component of the project, the program included bus tours, farm walks, newsletters and other methods of delivering and demonstrating the results of the different options tested by the groups.

The groups also provided information on the growers' requirements for variety information that were used to develop a "Best Management Practice for Varieties" in a format as requested by the groups.

4.0 RESULTS AND DISCUSSION

Throughout this entire section, net dollars per hectare ($/ha) have been calculated for each trial using the following formula and assumptions:

Net $/ha = [0.009 x sugar price (ccs-4) + 0.578 – harvesting and levies] x tonnes cane per hectare.
Where: harvesting and levies = $6.50; and growing costs are the same for each variety within a trial.

Costs of farm operations have been calculated using a Machinery Costing Model developed by Lionel Tilley of BSES. These are operating costs only and do not take into consideration fixed costs. Where: fuel = 0.49 c/L (after diesel fuel rebate) and labour = $13.95/hr.

4.1 Mossman

4.1.1 Emerging variety strip trial

A seedling from the BSES plant breeding program that had shown promise in the Mossman area was strip trailed in 1998 with three current commercial varieties. The trial was harvested in 1999 prior to the commencement of this project. The harvest results for both 1999 and 2000 showed that this seedling produced the best dollar return when compared to Q174[A], Q152 and Q120 on a Tully series soil type (Table 1). This variety now has the 'Q' number Q199[A] and was released in 2001 in the Mossman district. The additional information collected as part of this project was used to support its release.

Table 1: Ponzo's variety strip trial - Tully soil series

Variety	Plant 1999			1st Ratoon 2000		
	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha
Q199[A]	12.5	120	1584	12.9	101	1424
Q174[A]	13.0	110	1576	13.0	85	1218
Q152	11.1	123	1237	11.2	99	1018
Q120	13.2	101	1493	12.4	75	973

An average sugar price of $250 per tonne is used to calculate net $/ha. CCS values in Table 1 are relative ccs.

Maturity testing of Q199[A] and Q152 was also carried out at the request of the Mossman Variety BMP group. In Figure 1, three samplings were undertaken in June, July and August 2000. Generally, Q199[A] outperformed Q152 with maturity sampling indicating superior ccs through the first half of the season. CCS was calculated using individual fibres, which were determined using a Carver hydraulic press (Saranin, 1986).

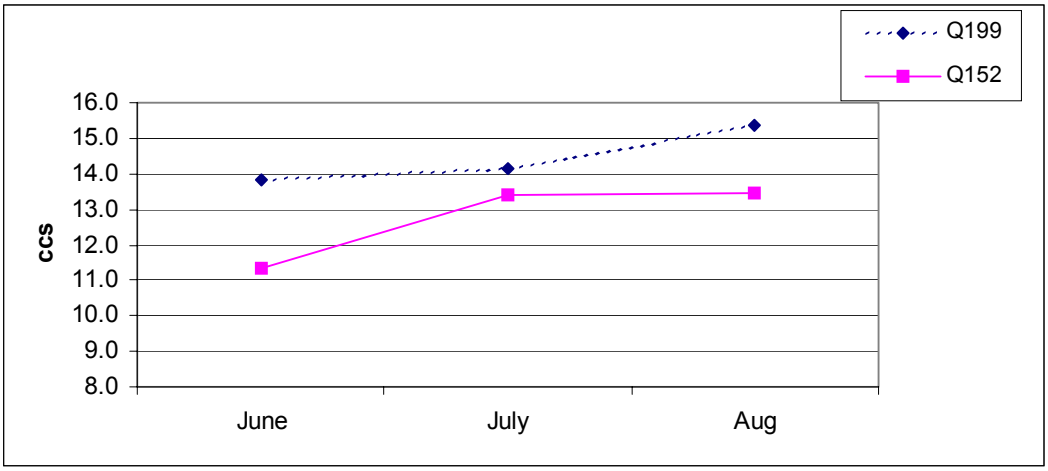

Figure 1: Q152 versus Q199[A] maturity trend in 2000

Currently Q199[A] is recommended to growers in Mossman on Tully series soil types as an early ccs variety. Q199[A] is being further trailed in Mulgrave, Mourilyan and Tully mill areas in commercial size strip trials.

4.1.2 South Mossman variety strip trial

This trial was planted in 1999 to compare the most recently released varieties for net returns to the grower. Plant results in 2000 showed that the more vigorous varieties performed better on the Clifton soil series of this trial. First ratoon results in 2001 were more varied, with some of the less vigorous varieties like Q187[A] performing better than the more vigorous Q167[A] (Table 2). All varieties were treated with the same inputs for both plant and first ratoon. Q181[A], a known high plant cane performer, has demonstrated the need to judge a variety over more than one crop, because the second ratoon is looking very poor. This trial will be harvested during the 2002 crushing season where all varieties including Q181[A] will be further tested for best economic returns.

Table 2: Variety performance at South Mossman on Clifton soil series

Variety	Plant 2000			1st Ratoon 2001			Average net $/ha
	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha	
Q166[A]	14.2	71.9	1554	13.8	93.3	1915	1735
Q187[A]	14.6	59.2	1344	15.0	87.5	2075	1710
Q181[A]	14.1	75.1	1603	13.4	81.0	1576	1590
Q167[A]	14.0	74.1	1562	13.2	81.4	1541	1552
Q186[A]	14.4	56.9	1260	14.8	71.6	1660	1460
Q174[A]	14.6	57.7	1302	14.0	68.2	1436	1369

An average sugar price of $300 per tonne is used to calculate net $/ha in Table 2. CCS values in Table 2 are relative ccs.

4.1.3 Comparison of planting methods trial

A large and complicated trial to demonstrate different methods of planting was established in Mossman in 2000. The trial looked at both single- and dual-row planting using both a whole stick and a billet planter. Two varieties were tested, Q166[A] and Q167[A]. Unfortunately, 2000 was a difficult year for plant cane with the crop growing poorly. The 2001 harvest results produced no conclusions as to the best method of planting for either variety.

4.2 Mulgrave

4.2.1 Variety x time of harvest – Watters

This trial compared seven varieties recommended for planting on the Jarrah series soil at Mulgrave. The trial was harvested at two times during the 2000 season to allow comparison of different times of harvest on these varieties (Table 3). The main highlight from this trial was that Q135 returned the best dollars per hectare on this soil type. This variety had not previously received consideration by growers as suitable to this environment. As a result, Q135 is being considered as a potential variety for planting in the 2001 and 2002 seasons in this area. Q174[A] is a major variety in Mulgrave and its disappointing performance indicates it does not suit late season harvesting. This is mainly

due to the prolific flowering this variety experiences every year. It is recommended that growers limit plantings of Q174[A] to approximately 30% and maximise returns by harvesting early to mid season. Q152 stood out as a variety that deteriorated considerably over time due to the impact of cyclone damage experienced early in 2000. This trial supports previous recommendations to harvest lodged and damaged cane as early in the season as possible before losses become more substantial (Hurney and Berding, 2000).

Table 3: Returns for varieties at different times of harvest

Variety	3rd August 2000			1st September 2000			Average net $/ha
	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha	
Q135	13.6	108	2081	13.5	106	1908	1995
Q172[A]	13.4	118	2106	13.1	103	1647	1877
Q120	15.0	93	1844	14.2	96	1775	1810
Q174[A]	14.0	100	1808	13.3	109	1792	1800
Q152	13.8	108	1909	12.1	107	1460	1685
Q113	12.6	104	1536	12.9	102	1596	1566
Q173[A]	12.9	66	1014	13.2	63	1013	1014

A sugar price of $260 per tonne is used to calculate net $/ha in Table 3. CCS values in Table 3 are relative ccs.

In 2001, this trial was harvested only once in September. Q174[A], Q152, Q113 and Q135 all performed well in first ratoon (Table 4). Averaged over the trial, Q135 was the best performing variety on the Jarrah soil series. Up until the release of these trial results, Q135 has been an under-utilised cane in the Mulgrave area. These results show that Q135 gives growers another variety option on this soil series.

Table 4: Variety performance in net dollars per hectare at Mulgrave

Variety	Plant 2000	1st Ratoon 2001	Average net $/ha
Q135	2394	2860	2627
Q174[A]	2163	2879	2521
Q172[A]	2259	2730	2495
Q152	2018	2877	2448
Q113	1892	2870	2381
Q120	2203	2526	2365
Q173[A]	1222	1980	1601

An average sugar price of $300 per tonne is used to calculate net $/ha in Table 4.

4.2.2 Variety x time of harvest – Angelino

This trial was established in 1999 to determine the best time to harvest Q174^A by comparison with the established variety Q120. Q174^A is a prolific flowering variety, which requires early planting and harvesting for maximum returns. Q120 was a major variety in north Queensland for many years and growers were keen to compare returns of the recently released variety Q174^A on the Innisfail soil series. The trial was harvested at two times during the 2000 and 2001 seasons and showed that Q120 achieves best returns when harvested early in the season, whereas Q174^A was the better performing variety on average both early and later in the season.

In the 2000 plant harvest, Q174^A outperformed Q120 at both harvesting dates. Table 5 shows the returns at a sugar price of $260. Relative ccs was used when calculating net $/ha in Table 5.

Table 5: Returns for Q120 and Q174^A in 2000

Variety	August 2000			September 2000			Average net $/ha
	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha	
Q120	14.5	85	1956	13.9	90	1944	1950
Q174^A	14.0	95	2044	13.3	99	1983	2013

In the 2001 1st ratoon harvest, Q174^A outperformed Q120 significantly at both harvesting dates. Table 6 shows the returns at a sugar price of $300. CCS values in Table 6 are relative ccs.

Table 6: Returns for Q120 and Q174^A in 2001

Variety	July 2001			September 2001			Average net $/ha
	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha	
Q120	14.8	76	1848	14.5	68	1584	1716
Q174^A	15.2	91	2297	14.8	95	2279	2288

Table 7 shows Q174^A achieved a $317 per hectare per year return above Q120. Q120 is now being superseded by Q174^A in many districts.

Table 7: Average returns for Q120 and Q174^A over 2000 and 2001

Variety	Average net $/ha 2000	Average net $/ha 2001	Average net $/ha per year
Q120	1950	1716	1833
Q174^A	2013	2288	2150

4.2.3 Trash management trial

A small, two-replicate trial comparing trash raking (Figure 2) versus conventional trash blanketing was conducted in a 1st ratoon block of Q135 on the alluvial soils in Mulgrave. This trial showed that there was a slight increase in net dollar returns to the grower at harvest in 2000 but the cost of carrying out the practice needs to be considered (Table 8).

Table 8: Returns of a trash management trial in Mulgrave

Treatment	CCS	Tonnes cane per hectare	Net $/ha	Cost of treatment per hectare
Trash raking	13.1	77	1220	23
Trash blanket	13.1	75	1191	0

A sugar price of $260 per tonne is used to calculate net $/ha in Table 8. CCS values in Table 8 are actual ccs.

Figure 2: Three-row trash rake

4.3 Babinda

4.3.1 Raised planting versus conventional planting

Raised planting (or mound planting) in the super wet belt is used with varying degrees of success to improve plant establishment during wet harvesting and planting seasons.

A trial was established in 1999 during low sugar prices to reduce planting costs and improve plant establishment. An increased profit of $221/ha was realised when a reduced tillage, raised planting method was compared to conventional planting. The profit was gained by reducing the costs of planting from $184/ha for conventional planting to $100/ha by reduced tillage, and by raised planting, the average returns were increased from $757/ha for conventional planting to $894/ha. The results are presented in Table 9.

Table 9: Bundaberg Sugar raised versus conventional planting (Tully soil series)

Raised planting practices	Cost $/ha	Conventional planting practices	Cost $/ha
Spray 4 rows	7.55	Press wheel/wheeled pig	16.16
Stomp @ 4 L/ha	44.00	Cutaway 1 row	29.35
Atrazine @ 3 L/ha	17.80	Cutaway 1 row	29.35
Gramoxone @ 1.5 L/ha	16.04	Cutaway 1 row	29.36
Fertilise and hillup 2 rows	14.25	Fertilise 2 rows	20.15
		Rip centres	30.79
		Scarifying 2 rows	14.34
		Hillup 2 rows	14.25
Total cost/ha	99.64	Total cost/ha	183.75
Average raised planting return per hectare	893.46	Average conventional planting return per hectare	757.06
Less operational costs	99.64	Less operational costs	183.75
Net $/ha for raised planting	793.82	Net $/ha for conventional planting	573.31

A sugar price of $260 per tonne is used to calculate average return per hectare in Table 9.

4.3.2 Flood tolerance variety strip trial

A seedling from the BSES plant breeding program had shown promise as a clone that withstood periods of inundation. This clone was planted into a strip trial on an alluvial soil at Babinda in 1999 with three other commercial varieties. All varieties were treated with the same inputs at planting and in ratoon. Harvest returns in Babinda for the 2000 season were low due to extensive flooding but this clone outperformed the other three commercial varieties (Table 10) and has since been allocated the 'Q' number of Q198[A].

Q198[A] has performed well in first ratoon in the Babinda area and as a result it has been planted in large amounts. This trial will be harvested as second ratoon in 2002 because Q198[A] appears to be a strong ratooning variety, which will suit flood prone areas in Babinda.

Table 10: Performance of Q198[A] at Babinda

Variety	Plant 2000			1st ratoon 2001			Average net $/ha
	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha	
Q120	13.1	41	765	12.1	66	1053	909
Q198[A]	13.3	46	883	12.0	60	933	908
Q152	13.5	35	690	12.0	53	832	761
*Q173[A]	11.4	19	267				

* Q173[A] was originally planted into this trial but due to its poor tolerance to flooding and damage by orange rust, this section of the trial was replanted.

An average sugar price of $300 per tonne is used to calculate net $/ha in Table 10. CCS values in Table 10 are actual ccs.

4.4 Innisfail

4.4.1 Mill mud trial

Mill mud was applied to a replant block of cane in 1999 and tested against the traditional amount of side dressing fertiliser that the grower would have applied. Results at harvest in 2000 showed no difference in productivity to the grower but profitability was increased (Table 11), because mill mud for this grower is a particularly cheap fertiliser option due to his proximity to the mill.

Table 11: Mill mud versus side dressing fertiliser in plant cane

Treatment	CCS	Tonnes cane per hectare	$/ha	Fertiliser cost/ha	Net $/ha
Side dress	13.7	92	1586	135	1451
Mill mud	13.7	98	1699	119	1580

A sugar price of $260 per tonne is used to calculate $/ha in Table 11. CCS values in Table 11 are actual ccs.

4.4.2 Trash management trial – Riordon

This trial was carried out in the Innisfail area with the intention of improving ccs by manipulating trash. Slightly better results were produced where the trash blanket had been burnt than where it had been manipulated or left as a green cane trash blanket (GCTB). This small difference in favour of burnt trash probably occurred because of the particularly heavy wet season during 2000. The same result during a dry season

may not eventuate. The cost of applying each treatment was also taken into account in the trial but the results between treatments were not considered significant (Table 12). An average sugar price of $300 per tonne is used to calculate $/ha before costs of operation deducted in Table 12.

Table 12: Trash management trial on Innisfail soil series

Treatment	CCS	Tonnes cane per hectare	$/ha before costs of operation deducted	Cost of operation per hectare $	$/ha after costs of operation deducted
Burnt trash	13.1	76	1211	119[1]	1092
Incorporated	12.9	64	988	38	950
Agrovator	13.1	60	955	19[2]	936
GCTB	12.4	66	942	0	942
Agrovator/rake	12.6	62	918	19+23[2]	876
Stool raked	12.3	64	897	23[2]	874

[1] The cost of two extra sprayings, totalling $119/ha, was deducted from the burnt treatment.
[2] Where certain implement costings were unavailable, costings of similar implements are used.

4.4.3 Trash management trial – Darveniza

This trial was originally intended to determine if ccs in Q138 could be improved by manipulating the trash blanket. This was not the case for either of the two trial years (2000 and 2001) that the trash management trial on red volcanic soils at Innisfail was harvested. The burnt treatment did not produce better results in the second year as it did in the first year (Table 13). This may be due to 2001 not being as wet as 2000. The cost of $119/ha for two extra sprayings has been deducted from the returns in the burnt treatment for both years.

Table 13: Trash management trial on red volcanic soil at Innisfail

Treatment	3rd Ratoon 2000			4th Ratoon 2001		
	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha
Trash blanket	12.0	80	1284	12.8	93	1643
Trash raking	12.2	83	1339	12.8	94	1672
Burnt trash	12.6	86	1433	13.0	98	1683

An average sugar price of $300 per tonne is used to calculate net $/ha in Table 13. CCS values in Table 13 are relative ccs.

Considering the benefits that trash blanketing provides, such as moisture retention, weed suppression and erosion control, the results of the above trial support the retention of a trash blanket on red volcanic soils.

4.4.4 Fallow versus replant trial

This trial was established to demonstrate the benefits of a soybean fallow on the subsequent plant crop. Q120 was the variety planted, it is not recommended as a replant variety but the results did show that a crop following a soybean fallow returned almost $300/ha more than the replant crop in the first year (Table 14). This trial will be monitored in future years to determine the full benefit of a soybean fallow on subsequent crops. A sugar price of $335 per tonne is used to calculate net $/ha in Table 14.

Table 14: Fallow versus replant plant cane comparison

Treatment	Tonnes cane per hectare	CCS	Net $/ha
Soybean fallow	77	14.0	1871
Replant	67	13.8	1459*

* $120/ha has been deducted to account for the extra expense of side-dressing the replant with nitrogen at 115 kg/ha.

4.5 Tully

4.5.1 Growing an erect crop

Different rates of nitrogen fertiliser were applied to a plant block of Q166[A] in 1999. Three rates of nitrogen were tested and the greatest dollar return was produced from the lowest rate of fertiliser (Table 15) when costs of fertiliser were taken into account. This trial probably best demonstrates the variations expected when trialing different nitrogen rates because BSES nitrogen recommendations are closer to 140 kg/ha than 60 kg/ha (Tully Variety Guide, 2001; Calcino, 1994).

Table 15: Different fertiliser rates applied to Q166[A]

Treatment	Tonnes cane per hectare	CCS	$/ha	Net $/ha*
Planting mix only (60 kg N/ha)	57	13.3	879	879
Planting mix + 80 kg N/ha (140 kg N/ha)	53	13.3	817	756
Planting mix + 120 kg N/ha (180 kg N/ha)	57	12.9	827	741

* Net $/ha is calculated less the extra costs of nitrogen at $350/tonne urea.

A sugar price of $255 per tonne is used to calculate $/ha in Table 15.

4.5.2 Flood tolerance trial

Q198[A] has been tested over a wide range of sites where it returned average results. During the 1990s its performance was noted on flood prone areas. Subsequent trials in Tully and Babinda have highlighted its ability to withstand prolonged periods of inundation.

This variety is recommended for these areas, though it is important to realise that inundation and waterlogging are quite different. Q198[A] will produce disappointing results in poorly drained conditions. The results of a strip trial on a recent alluvial soil on the banks of the Tully River showed promising results when compared to Q127, a variety regularly planted in this environment (Figure 3). Net $/ha returns for a plant and two ratoons have been calculated (Table 16) assuming an average sugar price of $300/tonne; harvesting costs and levies of $6.50. CCS values in Table 16 are actual ccs.

Table 16: Net $/ha for a flood tolerance variety trial on the Tully River alluvials

Variety	Plant 1999			1st Ratoon 2000			2nd Ratoon 2001		
	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha	CCS	Tonnes cane per hectare	Net $/ha
Q127	11.6	123	1796	12.5	46	783	13.6	69	1378
Q198[A]	12.7	103	1810	13.2	100	1892	13.8	126	2579

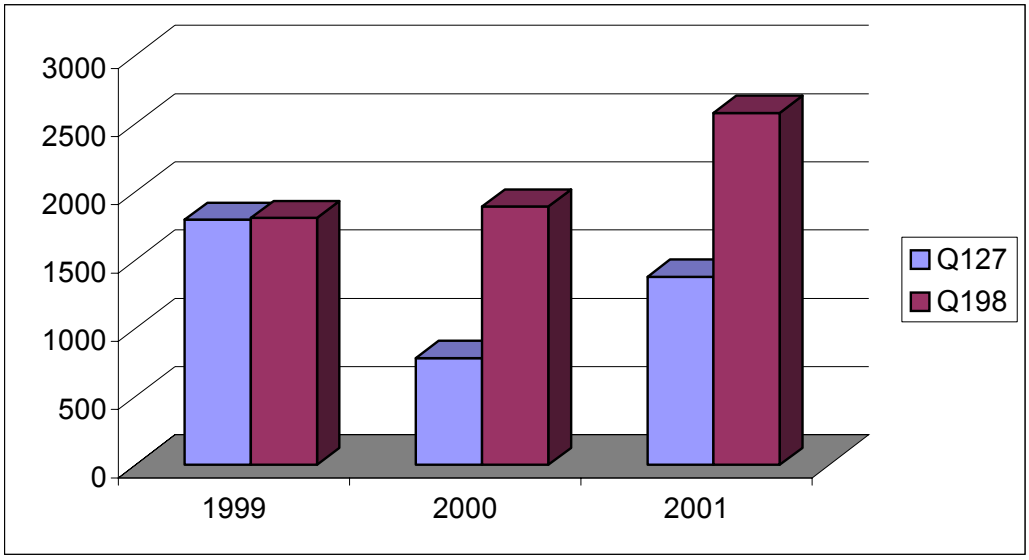

Figure 3: Cargnello flood tolerance strip trial - 1999-2001

5.0 FURTHER WORK

A series of trials has been established and ratooned in 2001 for harvest in 2002, after completion of the project. Extension officers in each region have committed to following these trials through for the 2002 season and extending the results back to the growers in their districts.

5.1 Trials planted in 2001

Mossman Recently released variety strip trial investigating Q186[A] and Q200[A]
Dual versus mound versus conventional planting by Q166[A] & Q167[A]

Mulgrave Variety strip trial Q152; Q200[A]
Flood tolerance variety strip trial Q181[A]; Q186[A]; Q199[A]; Q200[A]
Variety strip trial Q117; Q167[A]; Q174[A]; Q181[A]; Q187[A]
Strategic tillage variety trial Q152; Q186[A]; Q187[A]; Q200[A]; Q201[A]

Babinda Variety strip trial Q166[A]; Q200[A]

Mourilyan Emerging variety strip trial 84N2911; Q200[A]

South Johnstone Variety strip trial Q138; Q166[A]; Q174[A]; Q186[A]; Q187[A]

Tully Variety strip trial Q152; Q198[A]; Q200[A]
Variety strip trial Q187[A]; Q201[A]
Variety strip trial Q198[A]; Q201[A]

5.2 Observation sites planted in 2001

Mulgrave Three observation plots established to determine maturity curves, flood tolerance and canegrub tolerance of promising clones.

Babinda Two observation plots established to determine maturity curves and canegrub tolerance of promising clones.

Innisfail An observation plot established to determine maturity curves of promising clones.

An observation trial demonstrating the benefits of soybeans in a minimum tillage system will be planted in 2002. Four recently released varieties will be planted into this area in a strategically tilled situation and the advantages extended through the productivity groups in the district.

6.0 FOCUS GROUP STUDY

The main points to emerge from using an independent facilitator (Tilley, 2000) and focus groups to explore what motivates growers when selecting and managing varieties were:

- despite good planning on variety management, external factors such as rainfall, unscheduled harvesting or potential pest damage (Mourilyan, Mulgrave) override planned decisions;
- ccs performance is an important consideration with a preference expressed for 'generalist' ccs varieties rather than specialist early, mid and late season performers - some growers in all areas, particularly the Tableland, targeted early ccs varieties;
- more strip trials of recently released varieties to cover the range of major soil types within each district were universally requested. Organised trips (bus) were a favoured method of reaching these trial sites;
- the primary source of information when making decisions on variety choice is experience, firstly the grower's and secondly that of close neighbours. Harvester driver's observations were also highly considered;
- CPPB staff were widely recommended for their knowledge as were BSES staff;
- mill weekly ccs and annual productivity reports were well received although further refining in some mill areas was requested;
- handout material should be simple and concise - there was no call for a manual on variety management. A one-page photocopied sheet, preferably in a protective envelope, was the preferred format;
- the BSES fold-out variety guide was universally popular in assisting growers in the decision making process;
- early release of new varieties with limited information on performance is generally proving unpopular (except for Tableland and Mulgrave) due to the time lag (~3 years) for growers to trial varieties. Suggested that variety providers undertake a further two years testing before release to growers;
- lodging of planting material source was seen as a major factor in preventing the use of selected varieties. Late season planting of plants obtained from CPPB distribution plots was seen as a method of reducing lodging.

7.0 OUTPUTS

At the end of 2000, a series of focus groups was conducted as part of the project to determine what the industry wanted in the form of a variety BMP information package. It was quite clear from these focus groups (Tilley, 2000) that a complex manual was not wanted but information in a simple and concise format was required. We have devised a series of brochures that make up the total Variety BMP Information Package. Most of these have been sent out at various stages throughout the project.

Variety Guide Distributed in 2001. This is in a fold-out format and lists the most common varieties for each area along with their characteristics, soil suitability and best time of harvest. It is intended that this guide be updated biannually (Appendix 1).

Variety Release Sheets Distributed at time of variety release in 2001. These are single-page summary sheets on the four varieties released in 2001 (Q198[A], Q199[A], Q200[A], Q201[A]). The sheets summarise variety characteristics as well as display quickly any large scale mill trial results in $/ha. Parts of these variety release sheets have been used to standardise BSES variety release sheets (Appendix 2).

Fact Sheets/Newsletters Distributed throughout the project to all growers from Mossman to Tully.

Project Summary Distributed to all growers from Mossman to Tully in 2002. An 8-page document which summarises the important findings from the project and the management strategies to produce the best grower profitability using current varieties (Appendix 3).

8.0 EXPECTED OUTCOMES

The results from this project have made growers more aware of the consequences when choosing varieties to plant. The presentation of trial results in dollars per hectare has proved very beneficial. A lot of discussion has been generated at group meetings as a result of this information. Growers have appreciated the opportunity to discuss these results with their peers. Growers are more aware now of how important it is to calculate net returns and determine what variety or farm practice is more profitable on their farm.

Information delivered to grower groups as part of this project has provided growers with the skills and knowledge to conduct reliable trials on their farm. Growers should now be able to compare different variety performance and farm management practices on their own farm to meet their individual situations and determine the most profitable practice.

With the ability of growers to better test varieties for their individual situations, varieties released to the industry will have a fairer assessment based on individual needs and profitability rather than broad area recommendations.

This project has provided the northern industry with the opportunity to develop better information on emerging varieties. Varieties that have been released during the life of this project have had more information presented in release sheets than would normally have been available. Varieties due for release in the future have already been placed into large scale strip trials to provide the northern industry with more commercial data at harvest. The production of maturity curves for newer varieties has proved valuable when examining the profitability of these varieties to the industry.

This project has seen the successful use of group extension to target a large number of growers in the sugar industry. During 2000 and 2001 all northern mills, in conjunction with BSES, have established productivity groups similar to the participatory BMP process. The formation of these groups within mill areas provides an avenue to meet with larger numbers of growers more regularly than could be achieved on a one-to-one basis. This also provides an excellent opportunity for multi-agency input to discuss timely research and farming issues.

9.0 FUTURE RESEARCH NEEDS

The new Farming Systems BMP project complements the now completed CP2002 BMP projects.

Specifically, variety management and evaluation is the most important aspect of farm best practices because it is continuous and ongoing. Information availability is widely requested by industry due to new variety releases, changing farming practices, and variable environmental conditions. A regional variety management officer working with CPPBs, mill productivity staff and the BSES variety selection program would significantly improve profitability and productivity by identifying and investigating issues through a network of variety management trials conducted on-farm with participating grower groups.

10.0 RECOMMENDATIONS

It is recommended that:

- variety information be packaged in such a way as to remain simple and concise. Manual formats are not requested by growers (Tilley, 2000);

- commercial sized strip trials be conducted on recently released varieties and results distributed to growers to assist them in making better variety selection decisions;

- on-farm participatory trials be placed in areas that are not currently serviced directly by the current BSES plant improvement program. Areas such as the recent alluvials and sands do not have a specific component in the BSES plant improvement program, but a small number of promising clones could be propagated and planted into strip trials to determine the suitability of these clones to those specific areas;

- participatory groups be established throughout the industry as a routine extension technique to supplement one-on-one extension. Access by industry organisations, agri-business and other growers will improve industry profitability and productivity.

The successful use of participatory groups in this project highlights the need for mill areas to continue with the productivity groups that have been formed in each mill area from Mossman to Tully. The establishment of a group extension network allows greater grower contact in all mill areas as well as providing an avenue of communication to exchange ideas and technology.

11.0 PUBLICATIONS ARISING FROM THE PROJECT

Tilley, LGW. (2000) Report on Focus Groups: Best Management Practice Varieties BSES/SRDC Project Report BSS234.

Variety Information Package: Foldout Variety Guide; Variety Release Sheets; Newsletters; and Variety Trials at a Glance (project summary).

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BSES (2001) Tully Variety Guide.

APPENDIX 1

VARIETY GUIDES

Five variety guides were distributed in 2001.

- Wet tropics region - Innisfail/Babinda
- Tableland
- Mossman
- Tully
- Mulgrave

APPENDIX 2

VARIETY RELEASE SHEETS

These are single-page summary sheets distributed at time of variety release in 2001.

- Q198[A]
- Q199[A]
- Q200[A]
- Q201[A]

APPENDIX 3

PROJECT SUMMARY

An eight-page document which summarises the important findings from project 0234.