

**BUREAU OF SUGAR EXPERIMENT STATIONS
QUEENSLAND, AUSTRALIA**

**Report on BSES Workshop
Identifying Opportunities in
Harvesting and Extraneous Matter**

by

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MT96003

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SUMMARY

This is a report of the scoping meeting on harvest scheduling and extraneous matter held at BSES on Monday July 29. The meeting was designed to identify issues and opportunities for BSES in these areas. Staff selected for this meeting represented all disciplines of BSES and senior management. The meeting was designed to be outcome focussed with actions planned for the end of the sessions.

1.0 INVITATION AND PROGRAM

Harvesting and Extraneous Matter Meeting Opportunities for BSES

When:	Monday July 29
Where:	BSES Head Office
Reasons for the meeting:	To determine the opportunities for BSES in these fields.
Participants:	Chris Norris, Doug Paton, Gary Ham, Jason Bull, Ross Ridge, Robert Magarey, Trevor Willcox, Lionel Tilley, Peter Twine, Anne Campbell, Mac Hogarth, Don Mackintosh, Col Ryan and Gavin McMahon

We would like you to attend the following meeting on the opportunities for BSES in the field of harvesting and extraneous matter. This is an initial scoping meeting to determine if and where BSES has a role to play in this area of work. The agenda will be as follows:

Agenda

9.30 am	Col Ryan	Introduction
9.45	Trevor Willcox	A Field Perspective
10.00	Gary Ham	Previous BSES work in this area
10.15	Jason Bull	High early CCS program
10.30	Gavin McMahon	CRC and its program
11.15	Brainstorming session	
11.45	Group issues and prioritise	
12.30	Action Plan	
1.00	Lunch	
1.30	Peter Twine	Extraneous Matter recent events
2.00	Ross Ridge	Field Perspective
2.30	Don Mackintosh	Factory perspective
3.00	Issues to be addressed	
4.00	Action plan	
4.30	Summary and conclude	

2.0 PRESENTATIONS ON HARVESTING

Trevor Willcox presented a field perspective on season length duration. Trevor pointed out that it was not only the expanding mill areas that were confronting a season length problem where the increasing capacity of the mills is not matching the farmers' expansion. In districts where mill owners owned multiple mills, improve economic returns to the milling company may result in the closing of mills with a longer season length at the remaining mills.

An extended harvesting season would allow;

- crushing of larger crops,
- greater through-put for mills and harvesters,
- avoidance of wet weather harvesting,
- crushing of more extraneous matter.

The effects of extended season length would be;

- lower ccs,
- early and late ratooning problems,
- increased soil compaction,
- increased extraneous matter and dirt.

Using monthly weather and evaporation data from Bundaberg (appendix 1,2 and 3), Trevor showed that by extending the harvesting season in Bundaberg into the earlier period of the year the chance of harvesting under wet field conditions is greater due to the lower evaporation and higher rainfall. The data suggests that if fields are wet during the March-June period they will take longer to dry out and increase the problems associated with weather harvesting. Mean monthly minimum temperatures (appendix 4) for Bundaberg also show that ratooning from cane harvested in the March to June period will coincide with low temperatures. Ratooning under these conditions is difficult and management systems need to be developed to overcome the problems. The chance of ratoon failure also increases dramatically during this period. Seasonal CCS graphs (appendix 5) for Fairymead show that the trend is for lower ccs earlier and later in the season. Any advancement into these periods will certainly reduce ccs.

Trevor presented research issues for extending season length.

1. Improve early and late ccs;
 - varieties,
 - ripeners,
 - irrigation strategies.
2. Develop ratooning systems for wet and cold conditions;
 - mounding,
 - herbicide recommendations,
 - drainage recommendations.
3. Farming systems to reduce soil compaction;
 - wider dual rows,
 - no traffic keep out recommendations,
 - machinery flotation recommendations,
4. harvester cleaning systems for wet conditions.

Gary Ham presented a summary of BSES work conducted in this field over the past three decades.

In Tully a growth analysis trial based on cyclic-changeover design was undertaken during the 1970's. The results were analysed but not formally published because of the disastrous effect of flooding on the ratooning of some plots and the inability of the design to cope with such an event.

For the Burdekin growth analysis experiments were carried out on a cyclic changeover design with plantings in 1973 and 1975. Results from the initial planting were published in QSSCT in 1978. Combined results from both plantings were published as an internal report (Project 103.20.010). Measurements of direct effects showed no evidence of increases on cane yield despite favourable environmental conditions. CCS reflected the usual type of maturity curve for QLD crops, and fibre increased throughout the season. Residual effects were large with significant depression of yields of cane and sugar from late ratooning. The degree of this effect varied with variety. There was no significant residual effect of time of ratooning on either ccs or fibre content.

Two trials of factorial design were conducted at Mackay, planted in consecutive years 1972 and 1973. Harvest dates from plant cane ranged from July 18 to November 22, whilst ratoon harvest dates were between June 12 and November 22. Again relativity to the normal start finish dates of local mills needs to be established. Results of this study were published in a paper to QSSCT in 1976. There were some differences to the results of the Burdekin study. This was in part due to the effects of late harvests being in wet conditions. In this experiment both high early and high late sugar varieties were used.

A Bundaberg study commenced in 1973 to examine the influence of harvest on yields and ccs and the subsequent ratoons. This was reported as Project S 32 (a) growth analysis trial- Bundaberg 1973-75. There were some differences to the findings of the Mackay and Burdekin studies, but the effect of late harvest on subsequent ratoon yields were similar. This experiment followed an earlier trial for which no report has been located. A search of annual reports may provide some information in this regard. Similarly, a cyclic changeover design experiment was thought to have been conducted here. This needs to be confirmed. Analysis using this data to estimate the effects of length of crushing season on a range of factors was carried out in 1986 by Graham Kingston.

The Biomass accumulation in sugarcane project conducted in Ayr and Bundaberg from 1979 to 1982 produced a number of models for calculating cane yield for different crop initiation times. These may be of use in a length of season study.

Ross Ridge presented the results of a Bundaberg Time of Harvest Trial which ended in 1996. The results show;

- Significant depression of ccs in plant cane,
- Depression was greater with spring plant as opposed to autumn plant,
- 12 month ratoons only had a 0.1-0.2 unit ccs depression,
- High early ccs varieties had ccs 1.5 units higher than the trial average,
 - Average ccs,
 - normal harvest season 15.1
 - start 2 weeks early 14.73
 - start 4 weeks 14.42

Lionel Tilley also demonstrated the project the Mackay BSES team produced for the local Industry on extended season length (which is attached as appendix 8). This exercise shows that crop production starts from a low of 8 tonnes of sugar/ha in May, peaks at 15 tonnes of sugar/ha in September and falls away again to a low of 9 tonnes sugar in November.

Jason Bull then presented a plant breeder's perspective.

Jason identified three main issues to be addressed. Correct economic stimuli to change systems, CCS targeted harvesting and variety management. The economic stimuli needs to examine the benefit for the whole industry; across regions, within individual mill areas and for specific Miller/Grower cases. Any new arrangements need to: allow the harvesting of variable proportions of a farm across the season, encourage specific season niche cane growing, risk payment to growers for harvesting in high ratooning risk periods, and risk payments for growers for decreased sugar yields through non optimal times of harvest.

CCS targeted harvesting should explore: location by using historical information to harvest by district or area, maturity testing- harvesting by monitoring ccs and selecting the high ccs blocks, designated growers allowed to supply cane to agreed niches within or outside the current season.

Variety management involves the use of ripeners, water stress, nitrogen stress, close row spacing, age at harvest, high and early ccs.

Jason's recommendations were for BSES to;

- provide an unbiased economic analysis and recommendations,
- assess the benefits and promote commercial options for ccs targeted harvesting,
- adapt research to develop variety management packages.

The final presentation in this section by ***Gavin McMahon involved the CRC's activity*** in this area.

The CRC's options for alternative crop schedules is activity 3.2.2 of the CRC and involves CSR, CSIRO, Mackay Sugar, Sugar North, and BSES. The project aim is to develop scenarios of the impact of different crop schedules on industry profitability in mill areas having a wide range of climatic and crop management conditions. The program will operate in the Herbert, Burdekin, Mackay, Atherton Tableland and Ord River districts. The program will develop long term rainfall database risk assessment for wet weather; assess the availability and quality of yield, ccs and other data; field experimentation; assess different models and prediction tools, and conduct sensitivity analysis. The program also has a technology transfer component. The outcomes of the Sugar Industry Working Party were also discussed.

3.0 HARVESTING - ISSUE IDENTIFICATION AND ACTION PLAN

After the presentations a list of issues were developed and ranked. The list of issues were

- Ratooning systems for early harvest
- Variety management
- Whole industry economic advice
- CCS targeted harvesting
- Chemical changes of cane during maturity
- Irrigation management
- Dry-off water management
- Cane payment formula
- Redesign cane plant
- Review what we have done and understand the SIRWP
- Knowledge base to the industry for handling the issue
- Establish links to the CRC
- Weather issues
- Physiology of ccs-dehydration
- Understand Muchow's theory
- Evaluate BSES linkages
- Understand the milling constraints to extended season
- Socio Economic aspects of extended season
- Biological effects
- Reduce extraneous matter
- Soil degradation
- Effects of late harvest
- Cost of harvesting after rain
- Age of crop effect
- Benefit to BSES in this area
- Seasonal mapping

The priority setting and action is as follows;

<i>Votes</i>	<i>Issue</i>	<i>Action</i>
15	Whole industry economic advice- incentives	Col Ryan to negotiate with Canegrowers and ASMC
12	Review of BSES work	David Eksteen to complete by February 1997
10	Plant Chemical changes physiology of ccs	Don Mackintosh to organise
7	Variety Management	No immediate action
5	Ratooning systems for early harvest.	No immediate action

4.0 EXTRANEIOUS MATTER (EM) PRESENTATIONS

The second part of the workshop involved extraneous matter discussions.

Peter Twine and Don Mackintosh outlined the problem of extraneous matter, how to measure it, what the issue is, the perspective of the problem, the cost and specific issues. Peter explained that extraneous matter included soil, trash, tops, dirt, roots, extra foreign matter, suckers and weeds. The current measuring devices included mechanical sampling at the tippler and the carrier as well as hand sampling of bins. The industry produces sugar and EM contains no sugar. The levels have increased over the last two decades with significant increases recently. The high EM levels have an adverse impact on transport and mill crushing capacity. This effect on crushing capacity has been highlighted by mills with capacity deficiencies. There is also some conjecture that the cane loss project has been responsible for the recent increases in extraneous matter. EM is a loss/ loss situation and Alec Brotherton has documented this in ASSCT papers. Specific problems with extraneous matter have occurred in the Herbert, Mulgrave and Bundaberg.

Ross Ridge gave a field perspective of EM and believed that EM is influenced by field conditions and harvester operation.

The field conditions which effect EM are;

- Cane Variety
- Green/Burnt harvest
- Time of year
- Lodging
- Time of Day/Weather
- Weeds

The harvest operations which effect EM are

- Topping effect
- Speed of cutting
- Extractor settings
- Improved extractor design.

The specific details of each issue can be obtained in appendices 9-18.

Ross showed that over time in Tully EM had actually decreased which refutes the association with increasing EM and the cane loss project. Trends for the Mulgrave mill area show that EM has increased with the adoption of green cane harvesting. There is also a strong seasonal influence on EM and generally it is higher in the earlier weeks of the season. It is also evident that crop erectness has a great influence on EM with lodged crops increasing EM by 3% and increasing harvesting speed increasing EM by 3.5%.

5.0 EXTRANEOUS - MATTER ISSUE IDENTIFICATION AND ACTION PLAN

Again issues were identified and are as follows;

- NIR individual fibre
- Extraneous matter sampling method
- Field conditions for EM
- Extension campaign
- Payment incentives
- What is the optimum cane loss/EM
- Improved cleaning systems
- Cost of fibre
- Cause of rise in EM
- Optimum group size and time of cut
- Value adding opportunities to EM
- Secondary cleaning at the mill
- Instrumentation for harvester

Votes	Issue	Action
11	Cost of Fibre/ Incentives	CCR to discuss with industry representatives
11	Extraneous matter measurements	DM CN DP to scan options by March
8	NIR-Individual fibre	Nil/Steve in train
7	Extension campaign	No action yet
6	Value adding opportunities for EM	No action

6.0 CONCLUSION

The workshop was successful in obtaining its desired outcomes of developing action plans for BSES activities in the harvesting and extraneous area. All attendees actively participated and contributed to the end result. Interestingly, examining the financial implications of both topics was rated highly and needs to be addressed. This is an area where BSES can provide a non-biased view to the industry.

Gavin McMahon was given the responsibility to ensure that the actions listed above are achieved.