SOUTH AFRICAN SUGARCANE PRODUCTION AND QUALITY IN THE 2008-2009 MILLING SEASON

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Abstract

Sugarcane production and quality during the 2008/09 season are discussed at the South African industry and mill area levels. The Canesim crop estimates are used as the benchmark, and an attempt is made to explain differences between these model estimates, calculated from daily weather data across the industry, and actual mill records and Mill Group Board estimates. Aspects looked into include weather conditions, water sufficiency in the irrigated areas, the pest and disease situation and farm economics, and how these factors may have favoured or constrained farm practices and supply chain operations.

While weather conditions during the 2008/09 season were, in general, slightly less favourable for sugarcane growth than in 2007/08, in most areas they were more favourable for smooth functioning of the supply chain, resulting in a more modest decline in production than predicted by SASRI, as well as an improvement in cane quality. However, a strong recovery in production as initially anticipated by the Mill Group Boards was not realised. This is attributed to continued deterioration of already unfavourable socio-economic conditions to on-farm production capacity maintenance and new investments; and possibly aggravated by a further increase in the incidence of thrips (*Fulmekiola serrata*). These factors are expected to continue to have a negative impact over subsequent seasons. Other pests and diseases occurred at a fairly low level in most production regions.

In the small-scale grower (SSG) sector, sugarcane production continued its dramatic decline by more than 7% per annum over the past decade. Analysis of SSG production and area records suggests that, what appears to be extremely low yields in the Zululand and North Coast areas could in reality be a reflection of land abandonment, which would be more difficult to reverse.

Overall, the analysis provides a plausible explanation for the gaps between actual production and Canesim estimates which could contribute to better informed strategic industry decision making. Firmer conclusions and predictions, enabling a more proactive industry response, would require supplementary data and a better understanding of the impacts of specific constraints (e.g. thrips) on sugarcane production and quality. Timely, accurate estimates of areas under cane and areas harvested would be particularly useful to improve the analysis.

Keywords: sugarcane production, agronomics, economics, model, yield forecast, pests, diseases

Introduction

For the third year in a row, sugarcane deliveries in South Africa in the 2008/09 milling season were considerably lower than initially expected by the Mill Group Boards (MGBs). Over the past 10 years, only the very dry 2004/05 season had a lower production.

Total industry cane production in 2008/09 was 19.17 million tons; almost 0.5 million tons less than in 2007/08, which was also disappointing (van den Berg *et al.*, 2008). The mill areas that contributed most to this decline in production were Gledhow (-261 000 tons), Umzimkulu (-150 000 tons), Pongola (-141 000 tons), UCL (-133 000 tons) and Noodsberg (-112 000 tons). However, there were also some mill areas with higher production levels than in 2007/08, of which Darnall (+137 000 tons) and Malelane (+75 000 tons) are most noteworthy.

The quality of the cane delivered in 2008/09 was generally better than in 2007/08, and above the 10 year average.

The objective of this paper is to provide an agronomic characterisation of the season, and to explain the discrepancy between MGB expectations and realisations. Aspects looked into include, *inter alia*, weather conditions, the pest and disease situation, water sufficiency in the irrigated areas, and farm economics. This is the second time that such a comprehensive analysis has been attempted. In the first study (van den Berg *et al.*, 2008), examining the 2007/08 season, the disappointing cane quality attained was attributed primarily to wet weather conditions in the second half of that season. The main factors that were identified as possible root causes of the low production realised were sugarcane thrips (*Fulmekiola serrata* (Kobus)) and poor economic returns combined with a high degree of uncertainty regarding future land tenure, which would have acted as a disincentive to maintain sugarcane production. While the impact of these factors on production could not be quantified, it was suggested that they were likely to continue challenging the industry for the years to come. In the current study, again, it is anticipated that, in addition to exploring the past, the study may provide some food for thought about the future, which might help the industry to prepare for challenges, identify priority issues for preventive or remedial action, and guide new research.

Methodology

In general terms, the approach followed was the same as by van den Berg *et al.* (2008), comprising a review and synthesis of information from numerous industry databases and reports, which were complemented by questionnaires from regional experts and personal engagements. An attempt was made, however, to provide more detail about the specifics of different regions or mill areas, and to better distinguish longer term trends from unstructured year-to-year variation.

Information sources

The principal information sources used in this study were:

- Industry records of sugarcane supplies and quality at mill area level.
- Records of areas under cane and areas harvested as captured in the database of the SASA Annual Survey of Cane Production.
- Canesim crop estimates as compared to MGB estimates and final actual cane supply records.
- Weather data.

- Database of Local Pest, Disease and Variety Control Committee (LPD&VCC) field survey results.
- Indices of primary farm input prices.
- South African Cane Growers' Association (CANEGROWERS) annual large-scale grower (LSG) cost survey.
- Questionnaires to regional experts, complemented by personal engagements.

Industry records of sugarcane supplies and quality at mill area level

Industry records of sugarcane supplies and quality at mill area level were extracted from the Oracle database of the industry's Cane Testing Service (CTS). Data were summarised according to the growers' 'home mill'; i.e. in cases where deliveries were diverted, the cane was assigned to the home mill supply area rather than to the mill area to which it was rerouted. ERC % cane (estimated recoverable crystal, expressed as a percentage of fresh sugarcane weight) was used as the indicator for cane quality. Information on SSG sugarcane production was obtained from the annual Schedule of Deliveries published by the Sugar Industry Administration Board.

Areas under cane and areas harvested

Areas under cane and areas harvested were retrieved from the database of the SASA Annual Survey of Cane Production. These surveys consist of the results of questionnaires that are sent to all LSGs after the end of each milling season, in which they are obliged to indicate, *inter alia*:

- Area under cane at 1 April of the preceding season, plus the areas replanted during that season.
- Area harvested during the preceding season.
- Estimates of the area under cane plus replants, and of the area to be harvested during the current season.

For the seasons up to 2007/08, the data on areas under cane and areas harvested are the actual data. For the 2008/09 season, the estimates were used. The actual survey data on areas harvested and areas under cane in 2008/09 will only become available in September-October 2009.

In the case of SSGs, the questionnaires are responded to by persons appointed by the MGBs, usually cane procurement officers, who are responsible for the different sections of the mill area.

Canesim estimates vs MGB estimates and final production data

Yield estimates from the Canesim crop forecasting system (Bezuidenhout and Singels, 2007) were analysed and compared with the final actual production data, as well as with MGB estimates that are based on field assessments by growers and millers during the harvest season. The crop forecasting system uses the Canesim model (Singels at al., 1998), to quantify the effects of daily weather conditions on sugarcane yield of crops of similar age harvested in each month of the milling season (April to December) for 48 homogeneous climate zones. Irrigation is simulated according to typical regional strategies, including accounting for actual water restrictions. Weather data from SASRI's meteorological database (see below) are used, plus data from 10 historic seasons to substitute the (future) remainder of the season. The selection of the historic seasons is based on the climate outlook of the SA Weather Service. The simulation results (referred to in this paper as attainable yields, see below) are adjusted to actual industry conditions by expressing them as a percentage of the previous season's simulated yields. Production estimates are then calculated by multiplying these percentages with the corresponding actual production data of the previous season. Results are aggregated into mill and whole industry categories and published on the internet (http://sasri.sasa.org.za/cropest).

Attainable yields

Attainable yields, at regional and industry level, were calculated by the Canesim system using historical data since 1988. The attainable yield levels calculated correspond to the conditions for which the model was calibrated, i.e. experiment sites with fertiliser management according to SASRI recommendations, careful control of pests and diseases, negligible harvest losses, cutting cycles according to regional averages, and for one reference variety. A detailed description of the concept of attainable yields was given by Bindraban *et al.* (2000).

Weather data

Daily rainfall, radiation and temperature data from the SASRI meteorological database, recorded at numerous sites throughout the industry, were inspected to gain a better understanding of climatic factors that might explain variations in production.

Pest and disease database

Pest and disease (P&D) data used were derived from the database containing results of annual surveys by the LPD&VCCs across the South African sugar industry (Anon, 2005). Current and long-term infestation and damage levels derived from data extracted from this database over the period June to May were compared for each region (Way, 2007; Way and Goebel, 2007). For this study, the stalk borer *Eldana saccharina* Walker (Lepidoptera: Pyralidae), the fungal disease smut (*Ustilago scitaminea*) and sugarcane thrips (*Fulmekiola serrata* (Kobus) (Thysanoptera: Thripidae)) were investigated.

LPD&VCC surveys for *E. saccharina* are conducted in around 15 000 fields per year. The parameters looked into in this study are % fields infested by borer and % 'hazard' fields. Hazard fields are those where more than 10 larvae were recovered from a 100-stalk sample, and/or with stalk damage exceeding 5% of total stalk length in the sample. The latter parameter is locally referred to as 'stalk length red', as explained by Way and Goebel (2007). Fields in the hazard category should be harvested as soon as possible to reduce the chances of the pest spreading to adjacent fields.

Regarding smut (and mosaic), an average of 2300 fields covering 32 000 ha across the industry have been surveyed by the LPD&VCCs each year for the past 10 years, usually when the cane is 3-6 months old. This is done by inspecting a specified number of 50 m lengths of cane row in each field. The number of row sections inspected is dependent on field size. Disease incidence is expressed as % stools infected, assuming that there are two sugarcane stools per metre of cane row (i.e. 100 stools/row section) (Anon, 2000). Smut threshold levels vary from one LPD&VCC area to another, but are set in most cases at 3 or 5% stools infected. Where smut cannot be maintained below these levels through regular roguing (removal of infected stools or stalks), a ploughout order for the entire field is issued by the relevant LPD&VCC (Anon, 2007).

The selection of fields for inspection varies with mill area but, in many cases, fields planted to varieties known to be susceptible to smut or mosaic, are targeted. Generally, LPD&VCCs aim to visit each farm at least once per year; however, this depends largely on the number of teams operating in the area and the size of the mill area to be covered. For these reasons, it is not possible to make comparisons between mill areas, but trends over the years within mill areas can be analysed.

After an industry-wide survey conducted in 2005/06 (Way *et al.*, 2006a), thrips has been sampled each month in 18 fields at Umfolozi. To sample a field, 20 leaf spindles are randomly removed and thrips numbers are counted in the laboratory. Field infestation is expressed as the average number of *F. serrata* per spindle. See Way *et al.* (2006a) for a detailed description of the survey method.

Indices of primary farm input prices

Indices of primary farm input prices were calculated from the input prices detailed in the Crops and Markets quarterly reports issued by the Directorate of Agricultural Statistics, National Department of Agriculture. The sugar industry recoverable value (RV) price index was calculated using the final industry declared RV price since 2000/01, while sucrose prices were converted to RV prices for earlier years. All prices were indexed relative to 1995, which was taken as the base year (1995=100).

CANEGROWERS large-scale grower cost survey results

Trends on the economics of sugarcane production were derived from CANEGROWERS annual LSG cane production cost surveys for each season from 1997/98 to 2007/08. The survey data were obtained from LSGs who (i) utilise the CaneFarms Bookkeeping Service, (ii) complete the annual cost survey questionnaire, or (iii) submit annual financial statements. More information about these surveys can be found at www.SAcanegrowers.co.za.

The survey data were grouped at industry level and at major regional level by categorising the individual farm data per mill area within the larger region and weighting according to the sample area under cane relative to the total area under cane in each mill area within each region. The following categories were considered: (i) Northern Irrigated, (ii) Midlands and (iii) Coastal. Highly heterogeneous areas and areas that were considered transitional or atypical and too small to be considered as a separate category, were excluded from these groupings, but included in the industry level analysis. These concern Melmoth, Eshowe-Entumeni, Umzimkulu, Nkwaleni and Umfolozi. Other Zululand areas were included in the Coastal category. The number of survey participants varies between years and between categories; on average 31 (17-55) for the Northern Irrigated category; 183 (153-209) for the Coastal, and 64 (49-76) for the Midlands.

Real gross income per hectare and real total cost per hectare were derived from the cost survey results by removing inflationary influences from the data by applying the Consumer Price Index (2008 base year).

Questionnaires for regional experts

Other factors that may have influenced cane production and quality were assessed through questionnaires that were sent to 21 experts in the mill areas, mostly Extension Specialists. In the questionnaires, the respondents were asked to characterise the 2008/09 harvest season as compared to previous seasons, in terms of carry-over cane, the quality level of sugarcane husbandry, trends in farm management practices, pest and disease incidence, burning and harvest-to-crush delays, and the incidence of extreme events such as floods, hailstorms and runaway fires. Quantified information (e.g. in tons cane or ha) was requested when possible and appropriate. Responses were received from 14 experts, covering all mill areas.

Information extracted from the questionnaires was compiled and sent back to the experts for comments. Remaining ambiguities were discussed via personal engagements.

Results and Discussion

Cane supplies and areas under cane

Figure 1 shows the industry area under cane and cane production trends over the period 1999/00-2008/09 for the industry as a whole (Figure 1A) as well as for the 14 mills individually (Figure 1B-F). The total industry area planted to cane peaked in 2001/02 at 432 000 hectares, but has declined since then to an estimated 414 000 hectares in 2008/09. Total industry cane production also declined, from the all-time high of 23.88 million tons in 2000/01 to the aforementioned 19.17 million tons in 2008/09.

In the northern irrigated areas (Figure 1B), there has been an increase in the area planted to cane at Malelane and Komatipoort. Both mill areas presented a strong recovery in cane production since the 2006/07 season. In contrast, at Pongola, both cane production and the area under cane declined since 2005/06.

Cane production has presented a declining trend at all Zululand mill areas (Figure 1C), whereas the area under cane declined at Felixton and Amatikulu, but increased at Umfolozi.
Figure 1D (North Coast) shows a severe decline in area planted to cane and in cane production at Maidstone. Darnall also exhibits a declining trend, but with some recovery in 2008/09. The decline in area at Gledhow was arrested by a significant increase (from Darnall) during the 2007/08 season, but cane production declined from approximately 1 170 000 tons between 2004/05 and 2007/08 to 920 000 tons in 2008/09.

Figure 1E shows that cane production at the Midlands mills has been fairly stable except for the drought affected 2004/05 season. The area under cane has been increasing at Eston and Noodsberg, but decreasing at UCL.

Cane area and cane production have shown a consistent decline at the South Coast mill areas since 1999/00 (Figure 1F); however, the 2008/09 figures for Sezela show increases in both cane area and production.

Figure 2 shows the same information as Figure 1A, but for large- and small-scale growers separately. The LSG area under cane, which includes the miller-cum-planter areas, remained approximately constant at 345 000 hectares, although LSG cane production appears to show a slightly declining trend since 2000/01. SSG cane production has shown a more persistent decline, by more than 50%, from 3.85 million tons in 2000/01 to 1.73 million tons in 2008/09. Over the same period, the SSG registered area under cane declined by almost 20%, from 85 000 to 68 400 hectares.

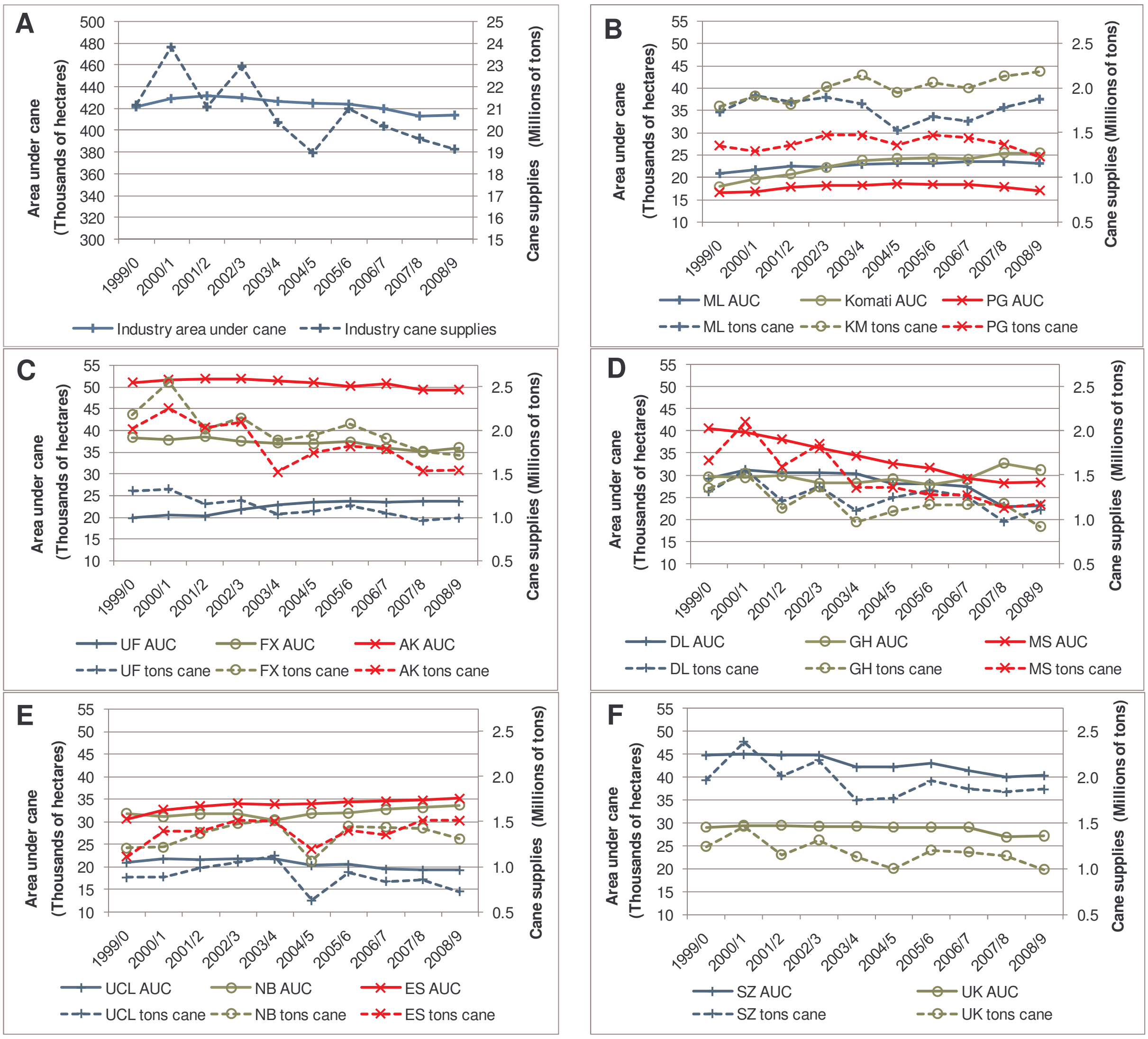

Figure 1. Areas under cane (AUC) and cane supplies: 1999/00-2008/09, for A: Totals South Africa; B: Northern Irrigated areas (ML-Malelane, KM-Komati, PG-Pongola); C: Zululand (UF-Umfolozi, FX-Felixton, AK-Amatikulu); D: North Coast (DL-Darnall, GH-Gledhow, MS-Maidstone); E: Midlands (UCL, NB-Noodsberg, ES-Eston); F: South Coast (SZ-Sezela, UK-Umzimkulu).

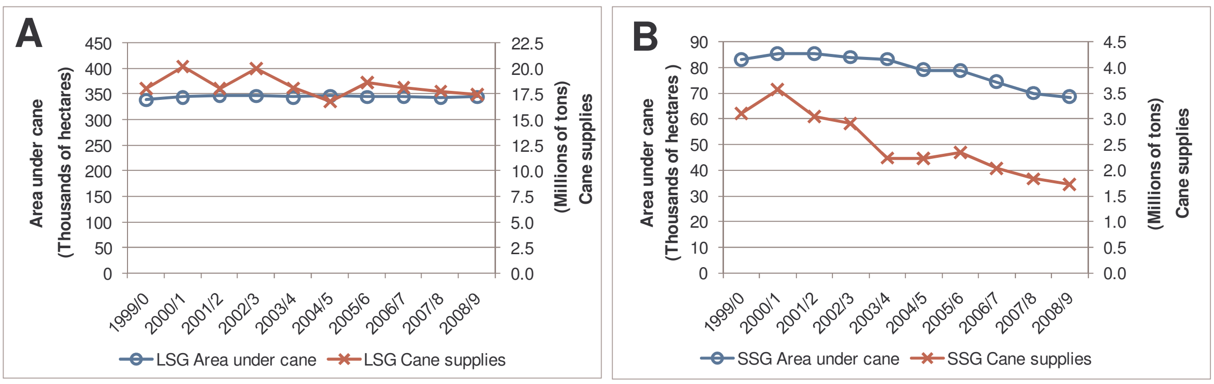

Figure 2. Industry area under cane and cane supplies, 1999/00-2008/09. A: Large-scale growers (LSG); B: Small-scale growers (SSG).

Quality of cane supplies

Figure 3 presents the quality of sugarcane supplied to the mills over the past four seasons, expressed in terms of ERC% cane. ERC levels at delivery were on average 11.8%, one of the highest levels in history. The Mpumalanga areas (Malelane and Komati), Amatikulu, Gledhow and Maidstone scored particularly well as compared to previous seasons. Umfolozi, UCL and Sezela presented ERCs which were below the 10 year average.

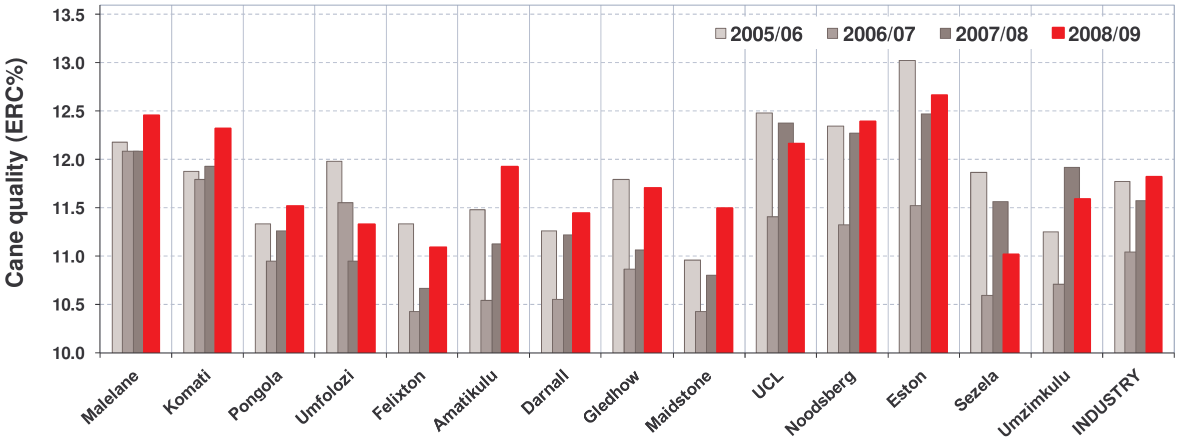

Figure 3. Estimated recoverable crystal (ERC) % cane per mill supply area for the milling seasons from 2005/06 up to 2008/09.

Weather

Dryland production areas

The main drivers of dryland yields are rainfall amount and distribution. Twelve-month running rainfall totals expressed as a percentage of the long term mean (LTM) provide a measure of the water status of the crops in different months during the harvesting season. As shown in Table 1, these values for the 2008/09 season are mostly lower than those of the 2007/08 season, except for the South Coast which received an unusually high rainfall in June.

Table 1. Total 12-month rainfall expressed as a percentage of the long term mean, averaged over each month of the harvest season for different regions in the sugar industry.

Region	2007/08	2008/09
South Coast	108.9	125.6
North Coast	105.3	95.1
Midlands	102.0	95.7
Zululand	102.0	93.9
Mpumalanga	70.4	62.9
Industry	104.4	101.1

In Zululand, the 12-month totals were at 110% of the LTM in the first part of the season, and then dropped during the winter to below the LTM. In the spring of 2008 rainfall dropped dramatically, to end at 76% of the LTM. A similar pattern occurred in the North Coast region. The South Coast 12-month total were close to the LTM initially and below that of 2007 and then increased dramatically to about 135% of the LTM and well above that of 2007 due to very high (and inefficient) rainfall received in June 2008. Twelve-month rainfall totals in the

Midlands were above the LTM and similar to that of 2007 for the first part of the season, but dropped sharply during the last three months to about 80% of the LTM (compared to 105% of the LTM in 2007).

The other two important drivers for potential yield and quality are solar radiation and temperature. There was a clear trend in 2008 of temperature in the Zululand and North Coast areas being below average, thereby limiting stalk growth. Radiation in the Midlands North region was below average thereby limiting yield potential. No clear trends in radiation and temperature were apparent for other regions.

Irrigated areas
Mpumalanga had slightly better water supply for irrigation in 2008 than in 2007. Rainfall was well below normal in 2008 but similar to 2007. Temperatures in 2008 were mostly below average, which could have hampered growth. Radiation was close to average.

The Umfolozi mill area had slightly better water supply during 2008 compared to 2007 (57% compared to 45% of unrestricted allocation), although this effect was largely negated by less favourable dryland conditions in the area. Here, temperatures were also lower than average, while radiation levels were normal.

Effects on cane quality and supply chain operations
While weather conditions during the 2008/09 season were, in general, slightly less favourable for sugarcane growth than in 2007/08, the drier and cooler conditions in winter and spring in most areas (with the exception of the South Coast) were more favourable for cane quality and smooth functioning of the supply chain. The latter is confirmed by results from the Sugar Logistics Improvement Programme (SLIP) which shows an average decrease in burning and harvest to crush delays.

Canesim vs MGB estimates and final production data
MGB and Canesim estimates of industry cane production issued during 2008/09 are compared in Figure 4. The last Canesim estimate, issued in August 2008, was 18.60 million tons of cane. A simulation run with a complete weather dataset conducted in February 2009 yielded a hindcast estimate of 18.42 million tons, i.e. 6.6% less than the actual 2007/08 production, reflecting that weather conditions leading up to the 2008/09 harvests were less favourable for cane growth than in 2007/08. MGB estimates in the beginning of the season started at 20.98 million tons and steadily dropped to the final estimate of 19.25 million tons, issued in February 2009, which is 2.4% below the production obtained in 2007/08. Hence, according to this analysis, the actual reduction in production was less than what would be expected from climatic and water supply effects.

Figure 5 presents a comparison at mill area level of changes in sugarcane supplies from 2007/08 to 2008/09. A fairly good match between Canesim estimates and actual changes is shown for Pongola, Felixton, Amatikulu and the Midlands areas. Considerable discrepancies were found for the other mill areas. It must be noted, though, that the Canesim estimates implicitly assume no change in areas harvested. Canesim results after correction for this effect are also shown in Figure 5, resulting in considerable improvement in the match for Malelane, Komati, Gledhow and Sezela.

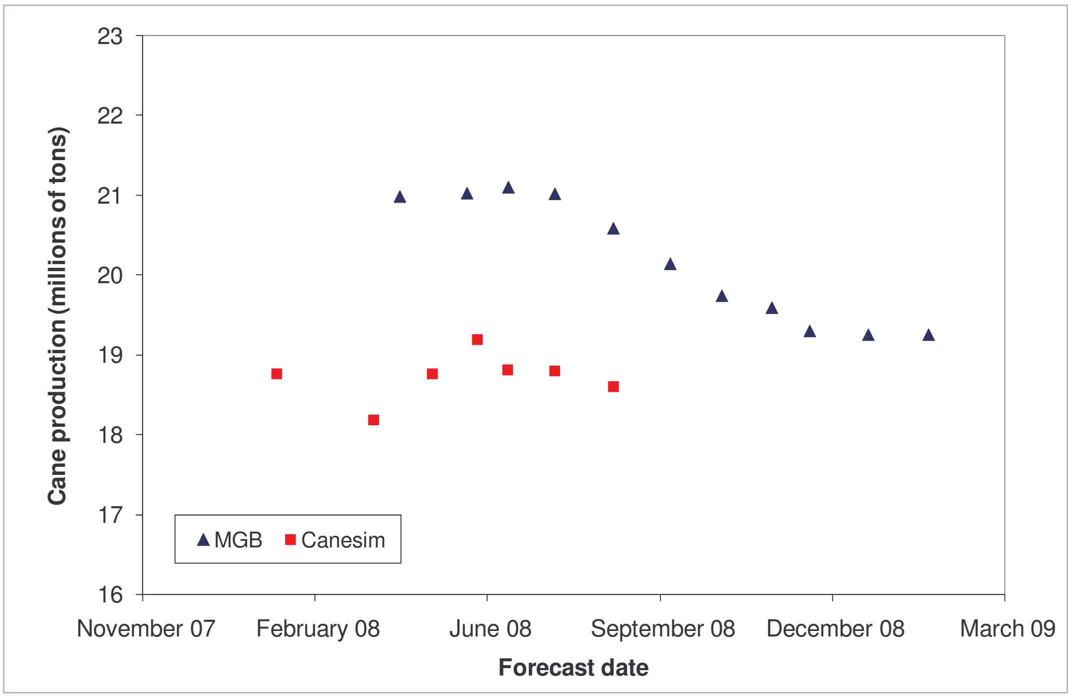

Figure 4. Mill Group Board (MGB) and Canesim estimates of industry cane production for the 2008-2009 season.

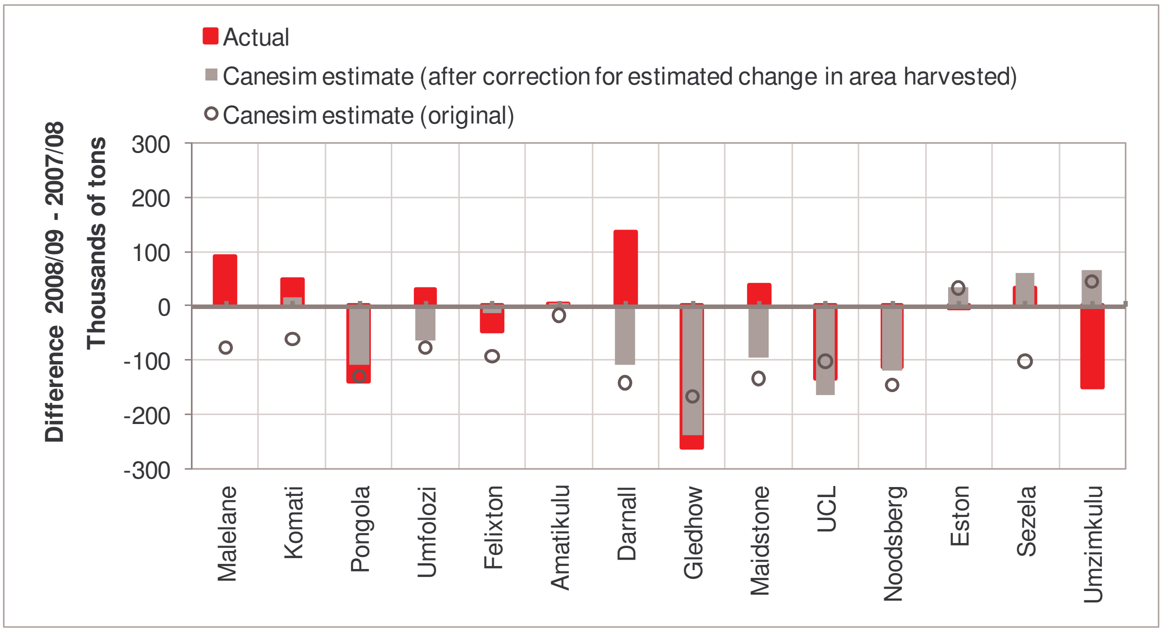

Figure 5. Change in sugarcane supplies from 2007/08 to 2008/09, according to the Canesim estimate made in February 2009, and actually realised.

Figure 6 provides a broader perspective on industry performance by indicating actual yield averages (tons per area harvested) for LSGs and SSGs separately, alongside the calculated attainable yields since 1988. Recall that the attainable yields are calculated with the same Canesim system as the crop forecasts, but *without* the use of the preceding season as a reference to adjust yields to industry conditions. Until 2005, with the exception of the northern irrigated areas, most regions show a good correlation between the attainable yields and the actual yields achieved by LSGs. After 2005 the trends diverge, presenting increased yield gaps.

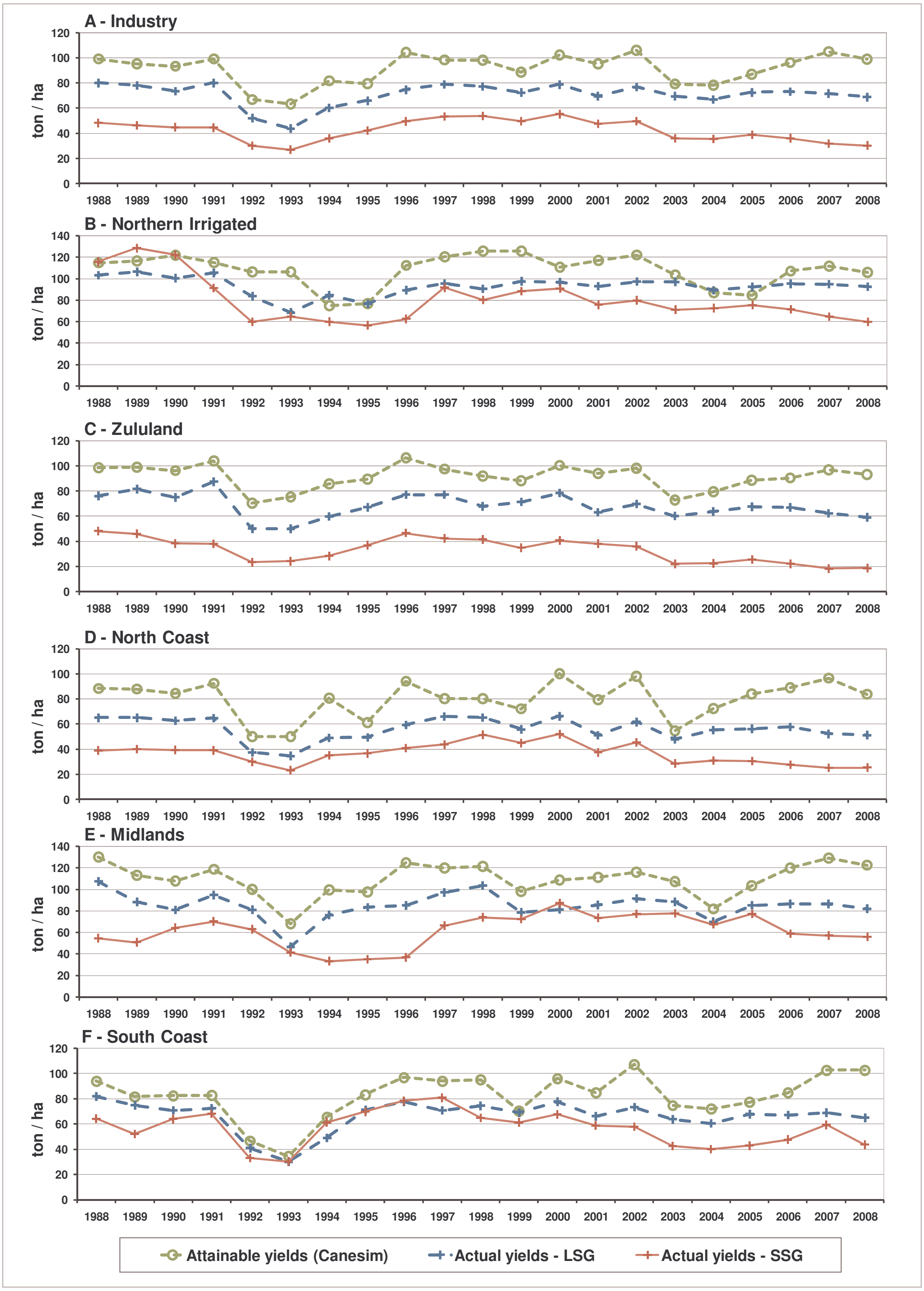

Figure 6. Average trends of large-scale and small-scale growers in South Africa's sugarcane production regions. Attainable yields calculated using the Canesim model; actual yields calculated from industry production and area data.

The correlation between attainable yields and small-scale grower yields is generally poorer than that for LSGs. The declining trend in SSG yields (and increasing yield gaps) also appears to have started earlier than for LSGs, i.e. since late 1990s, resulting in very low average SSG yields of around 20 tons/ha in Zululand and the North Coast areas.

Eldana

Figure 7 shows annual trends, derived from the LPD&VCC survey database, of industry-wide incidence of *E. saccharina*. Regional infestation levels in 2007-2008 (i.e. June 2007 to May 2008) compared with the long-term average, are given in Figure 8.

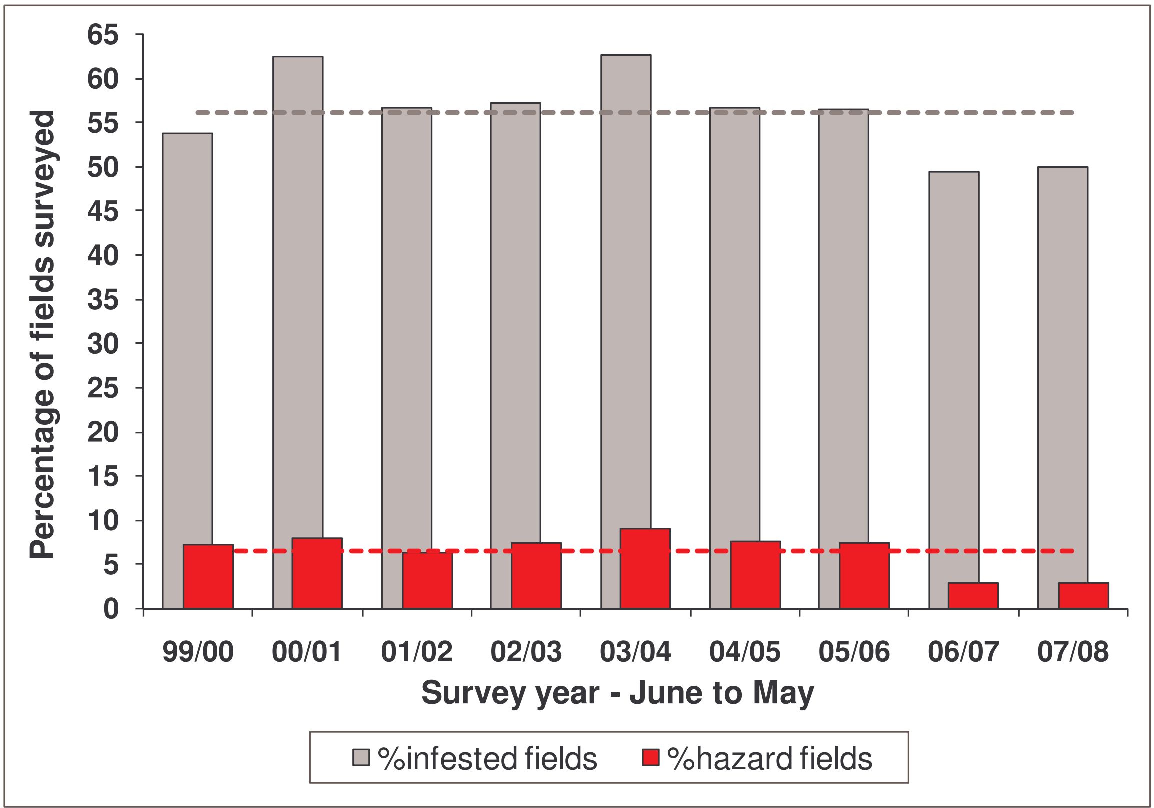

Figure 7. Trends in eldana infested fields and hazard fields, expressed as a percentage of the total number of fields surveyed across the industry. Horizontal hashed lines indicate industry averages from the 1999/00 season to the 2007/08 season.

These data indicate that last year's infestation remained similar to the relatively low levels measured the previous year. Year on year, in terms of % hazard fields, there was no appreciable increase in the industry as a whole (from 2.6 to 2.9%). However, at Felixton the hazard figure doubled (from 2.0 to 5.0%), whereas at Entumeni a fourfold increase, from 1.9 to 9.6%, was recorded; and the high level at Sezela increased further, from 10.9 to 12.2%. While these cases call for continued vigilance, the % hazard fields remained below the 10 year average.

Of concern is the lack of uniformity in the surveys. In most mill areas at least several hundred fields are surveyed, but this number varies strongly, apparently according to the perceived threats by the pest and manpower availability. For example, in 2007-2008, 2815 fields were surveyed in the Noodsberg area which historically has a very low incidence rate, whereas only 21 fields were surveyed in the Mpumalanga mill areas, and in Pongola no surveys were carried out at all.

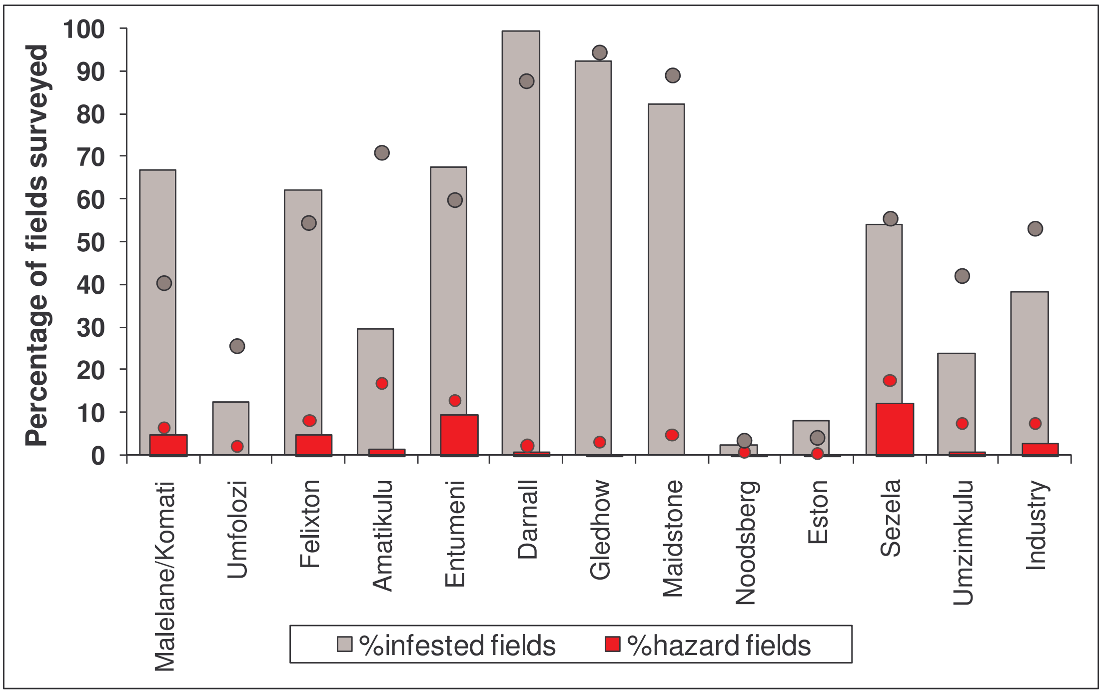

Figure 8. ***E. saccharina*** **infested fields and hazard fields, expressed as a percentage of the total number of fields surveyed in each mill area. Bars refer to the June 2007-May 2008 survey year; bullets indicate the long-term (1999/00 to 2007/08) average.**

Thrips

Thrips survey data collected over the past four years (Figure 9) show that infestations in the Umfolozi region have followed the same annual pattern, but with different peak levels. Typically, numbers are relatively high from September through to February and peak in December. There is a sharp decline between January and February, followed by relatively low numbers from March through to August. Infestations during the peak period from November 2007 to January 2008, which would have affected sugarcane yields during the 2008/09 season, are considerably higher than in the previous cycle. The last cycle in Figure 9, which appears to suggest a stabilisation, refers to sugarcane to be harvested in the 2009/10 season. It should be noted that, so far, the impact of thrips on sugarcane growth and yield has not been quantified.

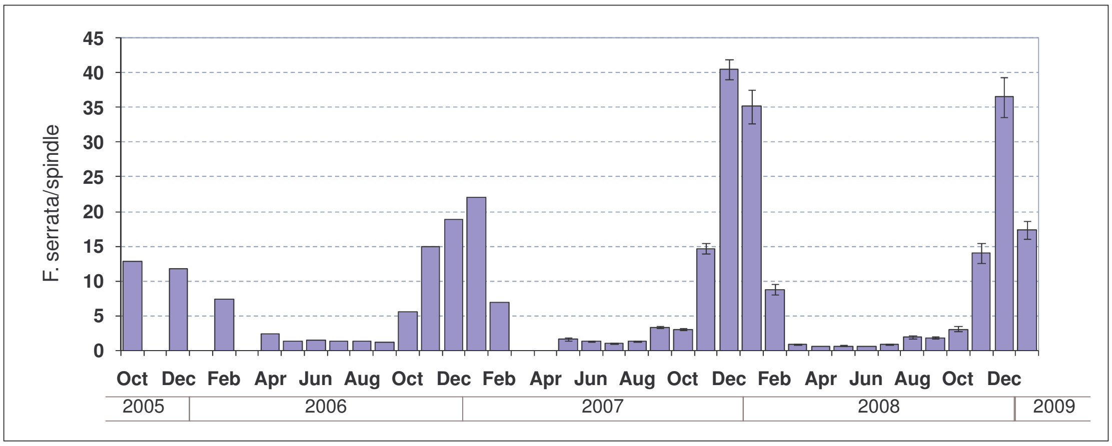

Figure 9. Thrips infestations in sugarcane at Umfolozi, monitored from October 2005 until January 2009.

Smut and mosaic

In most mill areas, disease levels for the period June 2007 to May 2008 were similar to those recorded over the same period the previous year. Average mosaic levels were low (0.2% stools infected) and unlikely to have had a noticeable effect on overall yield, while smut levels were generally acceptable. An overview of the variation in smut infection rates per mill area since 1997/98 is given in Figure 10.

Although the incidence of smut was higher in the warmer, drier northern regions compared to the southern and inland areas, an improvement was evident in the smut-prone areas of Felixton and Umfolozi. This improvement is mainly attributed to the continued implementation of effective management practices, in particular, the replacement of the smut-susceptible variety NCo376 with more resistant varieties. Good rainfall in June 2007 and timely summer rainfall may also have contributed to the reduction in smut levels in these areas. An increase in smut incidence was reported in the Malelane, Komati and Pongola mill supply areas. Survey results indicate a two-fold increase in smut levels in Malelane to 2.0% stools infected and, with the below average rainfall recorded in Mpumalanga during this period, it is likely that the disease would have had a negative impact on production. Rutherford *et al*. (2003) reported that losses of between 0.26 and 1.9 tons cane/1000 whips/ha could be expected depending on variety, crop stage and growing conditions, with losses increasing in parallel with crop stress. In the Mpumalanga area, the mean of 1.3% stools infected with smut equates to approximately 3000 whips per ha. Assuming a loss of 0.5 tons cane/1000 whips/ha under dry conditions, it is estimated that about 1.7% of the crop was lost in the Mpumalanga area due to smut.

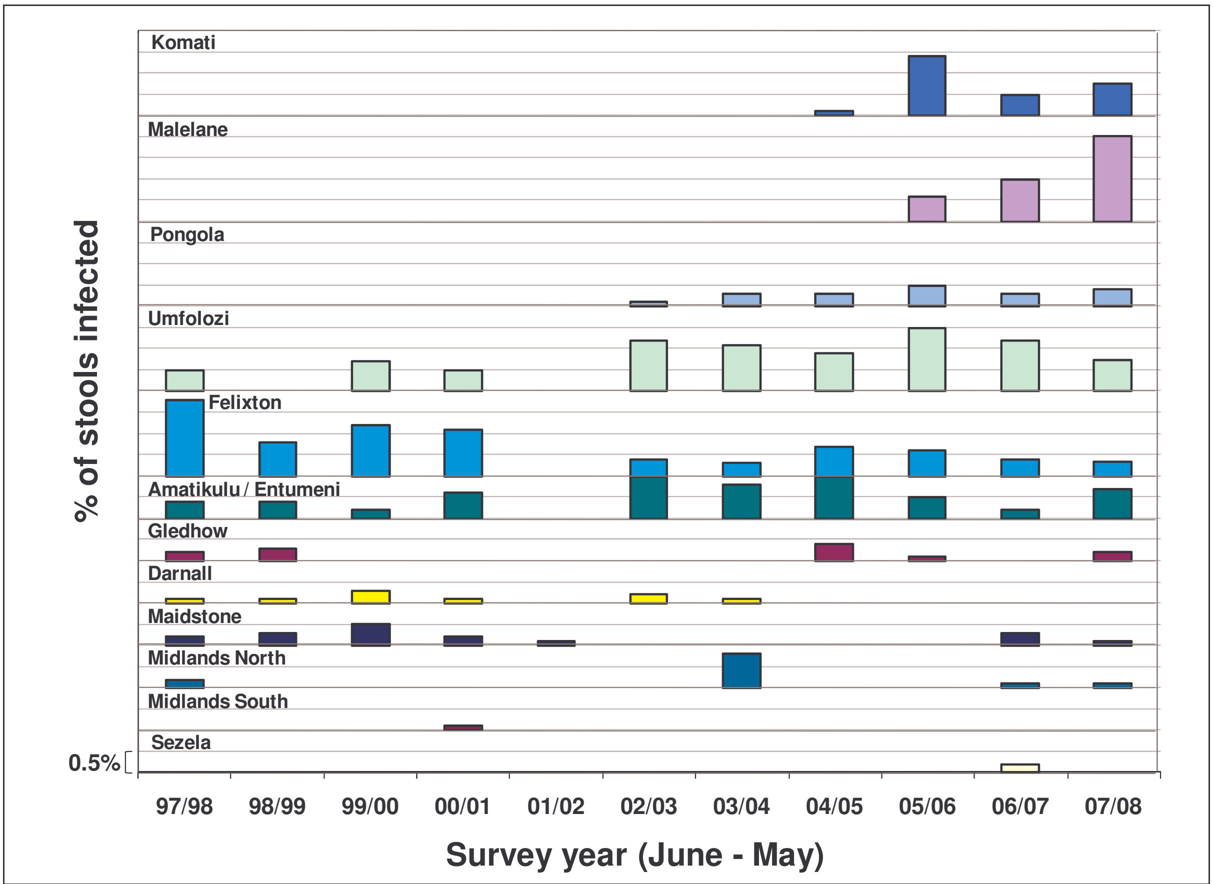

Figure 10. Variation in smut infection rates per mill area from 1997/98 to 2007/08 (0.5% between grid lines). No smut was detected in the Umzimkulu area (not shown).

Farm economics

Figure 11 shows that since 1995/96, the rate of increase in the RV price has been lower than the rate of increase in prices for primary sugarcane production inputs. Input price inflation of energy market derivatives (fuels and lubricants, fertilisers and chemicals) was particularly high over the 2007/08 and 2008/09 seasons.

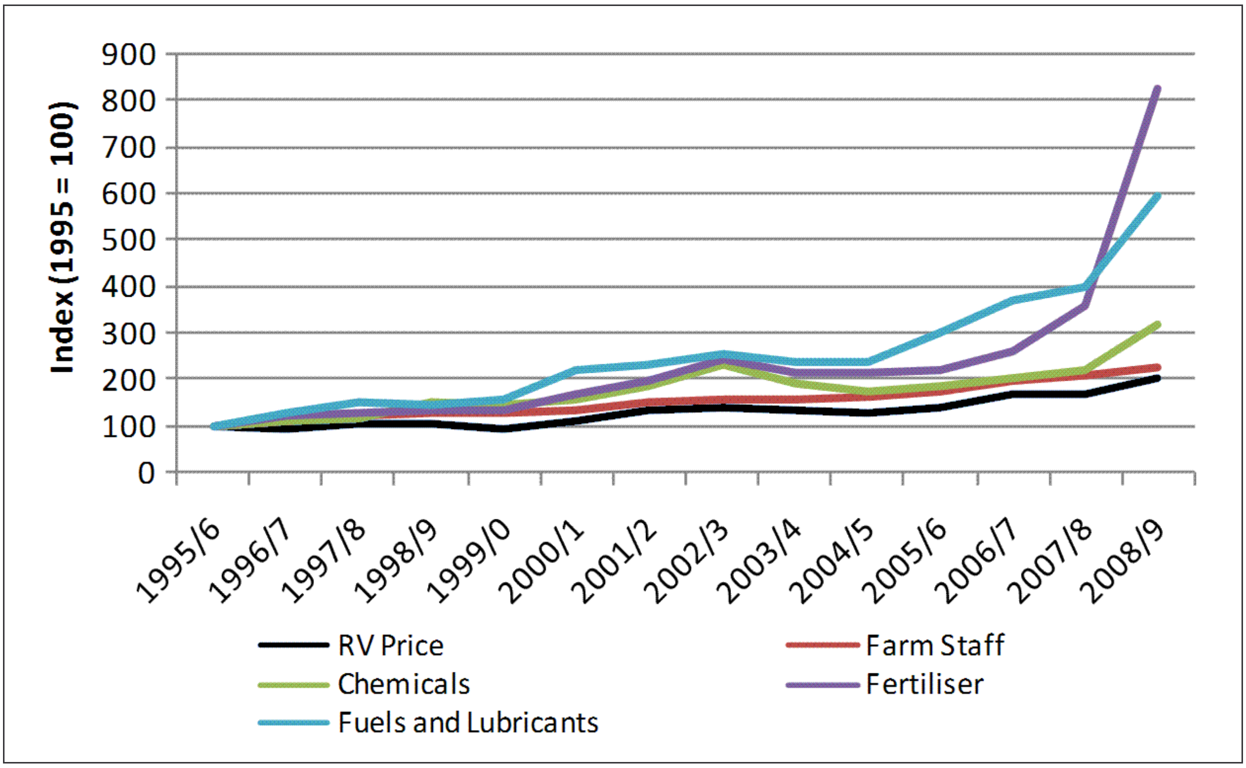

Figure 11. Indices of the RV price and primary farm input prices from 1995/96 to 2008/09.

This cost-price squeeze has placed great pressure on cane growers to improve their production efficiencies and has diminished returns to cane production, as shown in Figure 12, which presents the development since 1997/98, in growers' real gross income and costs per hectare under cane. The shaded area represents the shortfall between Gross Income and Total Costs including Return on Capital (ROC). A recurring shortfall implies an unsustainable cane growing environment, which has been the case since the 2003/04 season. The trend is similar in all three major production regions (Northern Irrigated, Coastal and Midlands), but is most serious in the Coastal areas, where sugarcane is predominantly rainfed and grown on a 12-month cycle. In the 2007/08 season, Gross Income in the Coastal areas was, on average, lower than Total Costs excluding ROC, a situation which represents a threat of bankruptcy. Cost developments in 2008 (Figure 11), indicate that the situation in 2008/09 would have further deteriorated, with possible impacts on operational management.

Results of engagements with regional experts

Table 2 provides a synthesis of the results of the questionnaires to regional experts, complemented with information obtained from personal engagements. The table is structured according to factors that would have had a positive or negative effect on changes in production levels in each mill area, but which are not accounted for by the Canesim system.

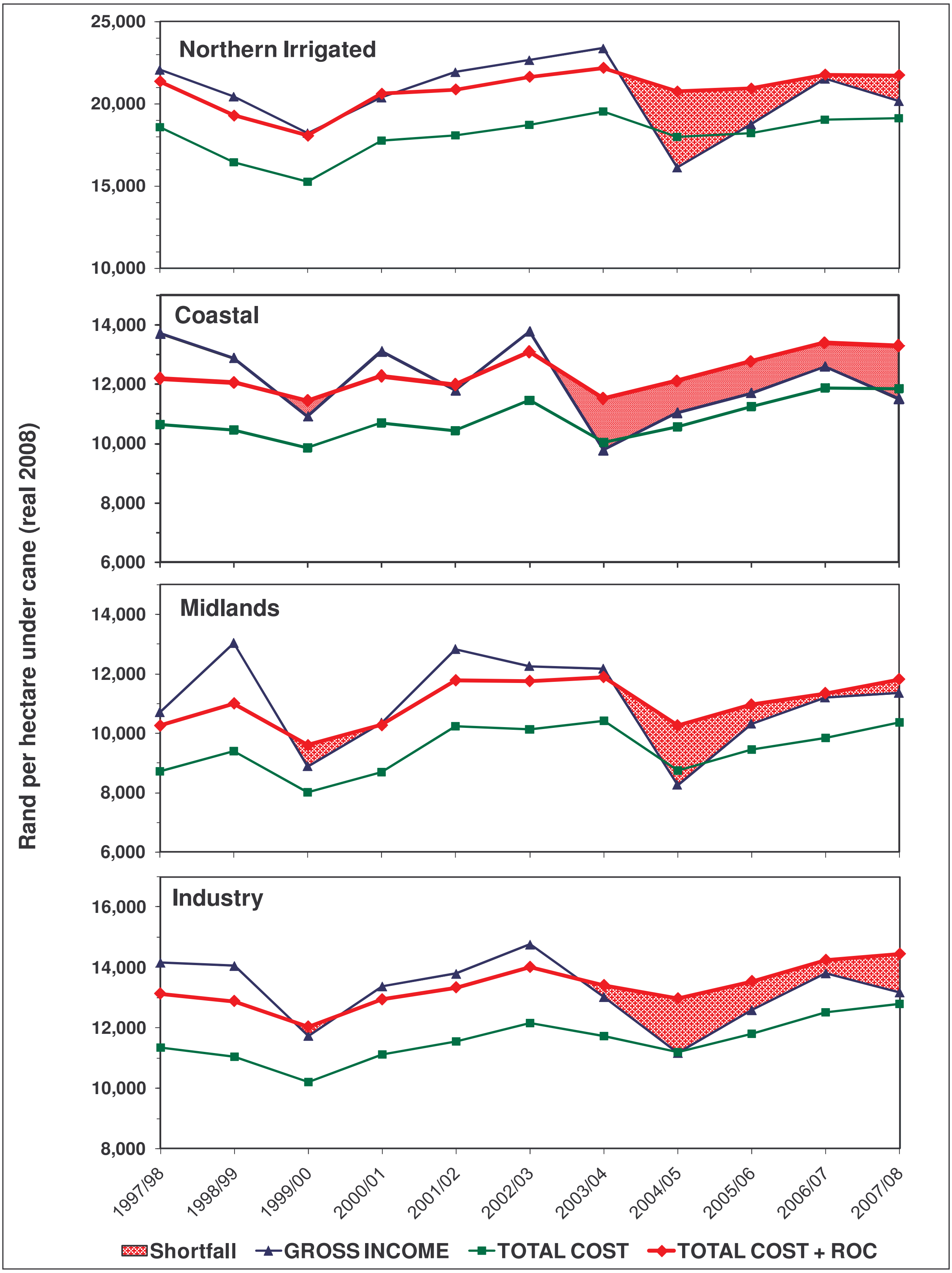

Figure 12. Real (2008 values) gross income and costs per hectare under cane of large-scale growers (1997/98 to 2008/08), derived from CANEGROWERS Large-Scale Grower Cost Survey results. The values for Total Costs exclude interest, rent and leases. Return on capital (ROC) represents an allowance of 7% on the determined capital value per hectare. The shaded area represents the shortfall between Gross Income and Total Costs + ROC.

Table 2. Indications by regional experts of factors with a positive or negative effect on 2008/09 sugarcane production, which are not accounted for by the Canesim system.

Mill area	Factors with negative effects on cane supplies	Factors with positive effects on cane supplies
Malelane & Komati	Increased smut incidence. Area harvested in 2008/09 was almost 1100 ha less than the initial 2008 estimate. This includes almost 500 ha due to gross neglect and/or land abandonment, 80 ha due to smut plough-out and 120 ha replants or change to vegetables.	
Pongola	Frequent irrigation disruptions due to power outages, during unusually dry summer months. Cumulative effects on sugarcane husbandry and irrigation, of numerous socio-economic problems, affecting SSG in particular, added to high input costs.	–
Umfolozi	Aggravation of thrips incidence.	Decrease in rust incidence; mainly due to most N29 fields being replanted with less susceptible varieties.
Felixton	Aggravation of thrips incidence. Ca 45 000 tons lost due to gross neglect and/or land abandonment.	–
Amatikulu	Aggravation of thrips incidence. Ca 8000 tons lost due to gross neglect and/or land abandonment. Ca 20 000 tons lost due to runaway fires.	Some decrease in eldana incidence.
Darnall	Some aggravation of thrips incidence. Some losses due to neglect and/or land abandonment.	Some decrease in eldana incidence.
Gledhow	Some aggravation of thrips incidence. Losses due to gross neglect and/or land abandonment (much of the effects will only be reflected in 2009/10 harvest). Problems caused by the mill being unable to open for crushing on the due date. Ca 10 000 tons cane lost due to runaway fires.	Some decrease in eldana incidence.
Maidstone	Some aggravation of thrips incidence. Losses due to gross neglect and/or land abandonment.	Some decrease in eldana incidence.
UCL	Many fields that were scheduled to be cut on an annual cycle were carried over to 2009/10, due to less than normal frost incidence.	–
Noodsberg	–	–
Eston	Losses due to hail, estimated at almost 80 000 tons; which will partly be reflected in 2009/10 crop.	–
Sezela	Many growers carried-over cane to 2009/10 (estimated at 47 000 tons) in hope of a better RV price and lower fertiliser costs. Losses, estimated at 71 000 tons, caused by storm and floods in June 2008. Aggravation of thrips and rust incidence.	–
Umzimkulu	Many growers carried-over cane to 2009/10 in hope of a better RV price and lower fertiliser costs. Cumulative impacts on ratoons and 2 yr cycle crops of three consecutive poor seasons in inland wards (ca 60% of the area), characterised by waterlogging, low temperatures and lack of sunshine. Losses to storm and floods in June 2008 (but much less serious than in Sezela mill area). Disproportionately poor performance of small-scale growers with additional loss of ca 44 000 tons cane. The situation in North Pondoland sugar is of particular concern. Ca 11 000 tons lost due to gross neglect and/or land abandonment of medium/large-scale grower crops. Aggravation of thrips incidence.	–

In most cases, the information in Table 2 provides a fair explanation for the differences between Canesim estimates and actual sugarcane supplies as indicated in Figure 5. However, it seems insufficient to explain the large discrepancies for Darnall and Maidstone, where actual production was much higher than the estimates. Furthermore, while expert opinions regarding Sezela suggest that almost 120 000 tons cane were not harvested due to conditions that are not accounted for by the Canesim estimate, the latter was only 33 000 tons higher than the actual production.

With respect to Darnall and Maidstone, It must be noted that there have been many reassignments amongst North Coast areas, some of which may not have been accounted for in this analysis. In the cases of Umfolozi and Darnall, it must also be noted that several of the causes of very poor performance in 2007/08 (the reference season in Figure 5.), did not recur in 2008/09. These include, mill problems and labour issues in both mill areas and a flood in Umfolozi. In the cases of Malelane and Komati, the discrepancy could be related to overestimation by the Canesim model of effects of irrigation water use restrictions on cane production. This would also explain the relatively flat trend in actual LSG yields over the past 10 years as compared to considerable variations in attainable yields indicated in Figure 6.

Additional comments from regional experts include:

- Concern about poorer management practices, particularly regarding fertiliser use, weed management and replanting frequency. Suboptimal fertiliser applications as a result of extreme price increases in 2008 are expected to impact on yields in the 2009/10 season.
- While the above concern seems to apply to most mill areas, it certainly does not apply to all individual growers. As one of the respondents commented: "Good farmers are probably farming even smarter, while weaker farmers are definitely farming a lot worse." The performance of new, inexperienced growers is of particular concern.
- Land claims pending for years with uncertain outcomes continue to affect long-term farm investments.
- Green cane harvesting is on the decline and practically irrelevant in most mill areas except Sezela, which presented a slight increase in area trashed, mainly due to its 'no burn' zone (2241 ha) east of the N2 between the Umkomaas and Ifafa Rivers. Yet, even at Sezela, the approximately 115 000 tons of cane that was trashed in 2008 represents only a modest 6.2% of cane supply.
- Mixed reports were given on crop rotation and green manuring. These practices are clearly on the increase in the Midlands and Zululand, where up to 20% of the fields are green manured at replant. They remain of little significance, though, in the coastal areas and Mpumalanga, despite active promotion by extension staff.
- There seems to be a (yet slight) trend towards somewhat longer cutting cycles in the coastal areas and Zululand, mainly with the aim of reducing input costs. Whether this will make economic sense in the long term remains to be seen. This will depend in particular on good eldana control.
- On the other hand, Midlands growers are increasingly managing frost pockets by replacing N12 (which is cut on a 24-month cycle) with newer varieties which can be cut on a 12-month cycle in these areas. Outside frost pockets, the newer varieties, such as N31, N37 and N39, as well as N16, need to be cut on a shorter cycle than N12. This will result in an average decrease in the cutting cycle.
- Additional challenges faced by SSGs, which directly or indirectly impact on production and yield, include destruction of sugarcane by cattle and goats, high incidence of runaway fires, insufficient harvesting and infield contractors, shortage of labour, illiteracy amongst growers, lack of business skills, lack of extraction roads, theft of sugarcane for resale in urban areas, and high input and transport costs due to unfavourable economies of scale and poor infrastructure.

Conclusions

- The results of this investigation indicate that, while somewhat less favourable weather conditions leading up to and during the 2008/09 growing season could explain most of the difference in sugarcane production with 2007/08, they do not explain the industry's continued poor performance as compared to preceding years; suggesting a persistence of non-weather related constraints.
- With the exception of the South Coast, weather conditions were generally more favourable for sucrose accumulation and smooth functioning of the supply chain, which explains the strong recovery in cane quality in most mill areas.
- Sugarcane thrips infestations continued increasing and likely impacted negatively on yields in 2008/09, particularly in the North Coast and Zululand areas where experts mentioned greatest concern. At this stage, however, it is impossible to ascribe a particular yield loss to this pest in the industry.
- Levels of other pests and diseases, including eldana and smut, tended to be lower than in previous years.
- Poor financial returns on sugarcane production and lingering land claims with uncertain outcomes continued acting as a disincentive to investment and, in the Coastal areas, to perform routine management practices. Again, it is impossible to ascribe a particular production loss to these circumstances. The perception is that poor returns could well have been the main reason for poor production in 2007/08 and 2008/09.
- Exponential increase in input costs during 2008/09, reportedly leading to suboptimal fertiliser application and weed management, is expected to have additional negative impacts on the 2009/10 crop.
- The SSG sector continued its dramatic decline in sugarcane production by more than 7% per annum over the past decade. Inferred average yields of 20 tons/ha or below in the North Coast and Zululand areas might actually be a reflection of land abandonment, which would be even more difficult to reverse.

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