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REVIEW OF SOUTH AFRICAN SUGARCANE PRODUCTION IN THE 2012/2013 SEASON FROM AN AGRICULTURAL PERSPECTIVE

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Abstract

The objective of this study was to analyse South African sugarcane production in the 2012/13 season and relate the key performance indicators of cane yield and cane quality to the main production factors. This could provide useful information for identifying research and management priorities for more efficient production of high quality sugarcane in South Africa.

The industry average cane yield was 65.5 t/ha, very similar to that achieved in 2011/12 and to the 5-year mean value. Cane yields were mostly driven by climate (erratic rainfall) and water availability, although the study suggests that yields could have been below par for Komati (irrigation inefficiencies on small-scale farms, high smut levels), Umfolozi, Felixton (high Eldana levels), and Amatikulu (high Eldana levels). Subsoil acidity has been identified as a major limiting factor in most regions, and requires urgent measures to mitigate its impacts on crop growth.

Generally, cane quality was better than the very poor levels of 2011/12, but was below the 5-year mean. The dry winter promoted good cane quality for the first half of the milling season; however, wet weather in the late season, combined with industrial strike action, caused a sharp drop in cane quality and limited the amount of cane that could be crushed in 2012.

Farm profitability of sugarcane production has declined from 2011/12 due to higher than inflation-based production cost increases. The expected increases in labour costs from 2013 onwards do not bode well for sugarcane farmers, and drastic measures will have to be taken to limit increases in production costs to remain viable and internationally competitive.

The review highlighted the potential benefits of accurate forecasts of future wet weather that could disrupt harvesting operations, as well as the need for more accurate estimates of area harvested.

Keywords: cane yield, cane quality, diseases, economics, modelling, sugarcane, pests, production

Introduction

The SA sugar industry produced 17.28 Mt of cane in the 2012/13 season, harvested from an estimated 263 369 ha. Corresponding amounts of cane for the 2010/11 and 2011/12 seasons...
were 16.01 and 16.80 Mt of cane harvested from 271 080 and 253 102 ha, respectively. These data translate to an average cane yield of 65.5 t/ha for 2012/13, compared to 59.1 and 66.5 t/ha for the 2010/11 and 2011/12 seasons, respectively. Sugar production increased to 1.96 Mt in 2012, from values of 1.92 and 1.83 Mt for the 2010/11 and 2011/12 seasons respectively. The cane to sugar ratio was 8.85 in 2012/13 compared to the very good 8.35 achieved in 2010/11 and the very poor value of 9.17 for 2011/12.

The 2012/13 season was the second consecutive season that showed an increase in industry cane production compared to the previous seasons after a steady decline since 2005, while the area under cane has increased from the previous season for the first time since 2000 (Figure 1). It thus seems that the declining trend in production in recent years has been turned around.

The objective of this paper is to analyse the production of the 2012/13 season and relate the key performance indicators of cane yield and cane quality to production conditions. Impacts of climate, pests and diseases, agronomy and socio-economic conditions will be analysed at mill level with a view of gaining some insights into the successes and failures of production management strategies. The study could also provide useful information for identifying research and management priorities for more efficient production of high quality sugarcane in South Africa (van den Berg and Singels, 2013).
Methodology

A similar methodology was followed to that used in previous reviews (van den Berg et al., 2008; Singels et al., 2010). Production data were mostly analysed at the level of mill supply areas (MSAs), while in some cases pest and disease data were grouped or subdivided into areas as defined by Local Pest, Disease and Variety Control Committees (LPD&VCCs) of the South African Sugar Association (SASA). Some results are also discussed in the context of broad agro-climatic regions (Figure 2).

The sugarcane produced in the 2012/13 milling season grew mostly from between April 2010 (long cycle cane) and December 2012 (annual cane), to between April 2012 and December 2012, when it was harvested. For simplicity, both the growing and milling season are referred to as the 2012 season.

Production data

Production (cane deliveries and cane quality) data were obtained from the SASA Cane Testing Service database, while the estimated area harvested was gleaned from survey data from SASA Industry Affairs or from data provided by Mill Group Boards. It should be noted that area harvested for the 2012 season is an estimate and will be adjusted for the next review when accurate, verified data will be available.

Actual yield data (computed by dividing home mill production with estimated area harvested) were compared to yields estimated by the Canesim yield forecasting system (Bezuidenhout and Singels, 2007) using observed weather data. Model estimates provide a benchmark of the agro-climatic potential for sugarcane production, taking into account soil properties, radiation, temperature and effective rainfall as well as irrigation water supply. Large differences between trends in actual and estimated yields were investigated by considering pest and disease and agronomic information.

Climate

The impact of climate was assessed by assuming that climatic conditions over the 12-month period leading to harvest influenced the status of the crop for all MSAs. Although some of the cane harvested in 2011 was already growing prior to April 2010, it was decided to exclude this period from the climate analysis to allow meaningful comparisons between MSAs. Rainfall and temperature records from various weather stations, averaged per MSA, and solar radiation records from a representative station in each MSA, were obtained from the South African Sugarcane Research Institute (SASRI) weather database. Twelve-month totals or average values leading up to each month of the 2011 milling season (e.g. April 2010 to April 2011, May 2010 to May 2011, and so forth) were compared to the corresponding long term mean (LTM) values. The deviations from the LTM (anomalies) were in turn compared to the corresponding anomalies for the 2010 and 2009 seasons.

The number of harvestable days was calculated from weather data by maintaining a daily water balance of the top 30 cm of a hypothetical soil. A given day was deemed harvestable when the simulated volumetric water content of this 30 cm layer was less than 80% of field capacity (taken as 26%). The algorithm is based on work by Bezuidenhout et al. (2008).
Figure 2. Map showing the 14 South African sugar mills and their location within broad agro-climatic production regions.
**Pests**

A number of insect pests impact production in the SA sugar industry. These include the stalk borer *Eldana saccharina* Walker (Lepidoptera: Pyralidae) (*Eldana*), sugarcane thrips (*Fulmekiola serrata* Kobus (Thysanoptera: Thripidae)), white grubs (various species of Scarabaeidae) and grasshoppers (Acrididae). Of these, the *Eldana* stalk borer and sugarcane thrips are the most widespread and serious threats to sugarcane production. LPD&VCC field survey results were used to provide information on the *Eldana* infestation, which was expressed as the number of larvae per 100 stalks (e/100). Damage is quantified as the length of stalk tissue with a red colouration (caused by a fungal infection at the site of the borer damage) expressed as a percentage of total stalk length examined (% stalk length red). Both infestation and damage levels are determined through random sampling of stalks. Larval numbers and damage data were averaged over the 12-month period from June 2011 to May 2012 and compared to the corresponding period in 2010/11, as well as to the average of the previous five seasons.

Information on the seasonal incidence of thrips was obtained from routine monitoring on the Umfolozi Flats.

**Diseases**

Smut (*Sporisorium scitamineum*) and mosaic (*Sugarcane mosaic virus*) surveys are conducted by LPD&VCCs annually, usually when the cane is three to six months old. A total of 5555 commercial fields covering approximately 36 000 ha (9% of the industry) were inspected for smut and mosaic between June 2011 and May 2012. This was done by inspecting a number of 50 m lengths of cane row in each field. The number of row sections inspected was dependent on field size. Disease prevalence is expressed as the proportion or percentage of fields inspected that were infected (Nutter *et al.*, 1991), while disease incidence is expressed as the percentage stools examined that were infected. The average infection rate for a given area is calculated by dividing the total number of infected stools by the total number of stools inspected in each area.

The selection of fields for inspection varies between areas. In most areas, fields tend to be randomly selected for survey, while in Zululand (Amatikulu, Entumeni, Felixton and Umfolozi), fields planted to varieties known to be susceptible to smut or mosaic are targeted. Generally, the aim is to visit each farm at least once a year, but this depends largely on the number of teams operating in the area and the size of the area to be covered. For these reasons, it is not possible to make comparisons between areas; however, trends over the years within areas can be analysed. Since ratoon stunting disease (RSD, caused by *Leifsonia xyli* subsp *xyli*) does not have any obvious external symptoms, diagnosis is based on the serological analysis or microscopic examination of xylem sap extracted from stalk samples (McFarlane *et al.*, 1999). Routine surveys of commercial fields are conducted annually by the LPD&VCCs to identify RSD-infected fields.

**Economic information**

Farm economics were analysed using data from a cost survey of large-scale growers by the SA Cane Growers’ Association, which is conducted at the end of each financial year (SACGA, 2013b). Only data up to the 2010/11 financial year was available at the time of print. For the 2011/12 and 2012/13 season, the data was adjusted using indices released by the Department of Agriculture, Forestry and Fisheries (DAFF, 2012). The survey elicits cost and income data from 15 to 20% of large-scale growers from all the major sugarcane producing regions in SA. Average cost and income statistics reported in this paper are
weighted by the number of growers in each region to account for relative over- or under-sampling of any mill regions. Real values (adjusted for inflation to 2012 values) of average production cost (excluding interest, rent and leases, but including depreciation and a management allowance), cost of capital (calculated at 7% per annum) and gross income were used to determine the profitability of sugarcane production over the past nine seasons.

Results

Overview
Cane production, area harvested, cane yields and cane quality of the 2012 season are compared to previous seasons. A summary of production conditions during the growing season in the different MSAs is provided, focusing on climate, soils, pests and diseases and economics. Cause and effect relationships are then discussed based on the separation of climatic impacts from non-climatic impacts that could possibly be managed.

Production information
Trends in cane production for individual MSAs are shown in Figure 3. Production has declined from 2011 for MSAs in Mpumalanga and Zululand, and has increased for North Coast and Midlands MSAs, as well as for Sezela.

![Figure 3. Cane production for different mill supply areas for the 2012 season compared to the 2010 and 2011 seasons and the five-season mean (LTM, shown as yellow horizontal bars).](image)

The estimated area harvested (Figure 4) in 2012 has declined from 2011 for the Mpumalanga MSAs due to interruptions in harvesting operations caused by industrial action and wet weather in the second half of the season. This was also the case for the North Coast MSAs and Umzimkulu. The area harvested increased for Pongola (due to replant programme),
Umfolozi, Midlands MSAs and Sezela. It is believed that the quality of this important parameter is not good, especially for the most recent season. An example is the oscillation in area harvested from about 29 000 to about 24 000 ha for the Felixton mill area, which is difficult to explain. Industry stakeholders should focus on revising survey methods and implementing modern technology such as GIS mapping and remote sensing to improve the quality of this important data.

![Figure 4. Estimated area harvested in the 2012 season for different mill supply areas, compared to the 2010 and 2011 seasons.](image)

Based on the production and area harvested data, cane yields have declined from 2011 in irrigated MSAs and in Zululand, while yields increased markedly for MSAs in the Midlands on the South Coast, as well as for two out of the three North Coast MSAs (Figure 5). For the industry as whole, cane yield declined slightly from 2011 and was close to the 5-year mean.

Cane quality, as quantified by estimated recoverable crystal (ERC) content of cane (fresh mass basis), improved from the very low levels experienced in 2011 and increased for the majority of the mills (exceptions were the two Mpumalanga mills and Umfolozi), but was still below the 5-year mean for many (Figure 6).
Figure 5. Average cane yields in the 2012 season for different mill supply areas and the industry compared to the 2010 and 2011 seasons and the five-season mean yield (LTM, shown as yellow horizontal bars).

Figure 6. Estimated recoverable crystal content of cane (ERC%) on a fresh mass basis for different mill supply areas and for the whole industry for the 2012 season, compared to the 2010 and 2011 seasons and the five-season mean (LTM, shown as yellow horizontal bars).
Production conditions
The status of main factors that determine production conditions and drive cane growth and productivity, namely climate (primarily rainfall, but also temperature and solar radiation), plant health (pests and diseases), soil health and economics, are now described for different MSAs for the 2012 growing season.

Climate
Average growing season rainfall totals for 2012 was higher than 2011, and above the LTM for all coastal mills except Felixton and for the industry as a whole (Figure 7). It was slightly lower than that of 2011 and below the LTM for irrigated areas and the Midlands.

Monthly distribution of rainfall for KwaZulu-Natal is shown in Figure 8. Noteworthy are three dry spells: a two-month spell from September to October 2011, another from January to February 2012, and a four-month spell from April to July 2012. Tropical storm Irina caused above-normal rainfall in March 2012, while rainfall in September and October 2012 was also well above normal.

Rainfall in Mpumalanga was well above average in December 2011 and January 2012, and again in September, October and December of 2012, thus ensuring an adequate water supply for irrigation (data not shown).

Figure 7. Total 12-month rainfall expressed as a percentage deviation from the long term mean, averaged over each month of the harvest season for different mill supply areas and the industry as a whole.
Harvesting conditions are determined primarily by the wetness of the topsoil. Dry conditions promote effective uninterrupted harvesting, resulting in good quality cane with little damage to the soil and cane stools, while the opposite occurs when the topsoil is too wet. Figure 9 shows that there were fewer harvestable days from April to December in 2012 than in 2011, for most MSAs except for Felixton, Amatikulu and Maidstone (12 days less on average for the industry). These reductions were caused by very wet conditions in September, October and December throughout the industry.

It is interesting to note that seasonal forecasts issued in September and October 2011 by the South African Weather Service (SAWS) correctly predicted low rainfall for the industry for January and February 2012. SAWS forecasts for September and October 2012 rainfall issued in June and July 2012 were less decisive, with predictions fluctuating between normal to above normal rainfall (personal communication).

The industry average temperature for the 2012 growing season was 0.5°C below the LTM, primarily due to two cold and cloudy spells in the winter of 2011 (1.5°C below LTM) and the spring of 2012 (1.1°C below LTM).

Average solar radiation for the growing season was below (0.3 to 6.9%) LTM for all MSAs with the coastal and Midlands South MSAs at 5% below LTM, while the Komati and Pongola MSAs were 2.4 and 3.1% below LTM, respectively. The industry average solar radiation of 3.1% below the LTM was close to that of the previous two seasons.

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Figure 9. Number of harvestable days from April to December for the 2010, 2011 and 2012 seasons, for the different mill supply areas and for the whole industry. The five-season mean (LTM) is shown as yellow horizontal bars.

**Pests**

**Eldana**

Trends in the stalk borer Eldana larval numbers for the various LPD&VCC areas are summarised in Figure 10a. While in most areas numbers were lower in the 2012 season compared to the 2011 season, in Amatikulu and Darnall numbers were higher. Increases were also shown in Mpumalanga and Eston, but from a very low base. The increase in Eldana numbers in Eston is of concern. Maidstone remains the area with the highest population levels (8.0 e/100 stalks), followed by Umzimkulu (7.5 e/100) and Sezela (6.5 e/100). However, in these areas, numbers were lower than the previous season.

In all areas, Eldana damage was lower in the 2012 season than the 2011 season (Figure 10b). The greatest decline in damage was shown in Eston, Maidstone and Amatikulu. The decline in Eston (83%) is particularly encouraging and may well be related to the Eldana control strategy developed by the LPD&VCC to combat the 2010/2011 Eldana outbreak. Although the highest level of damage was recorded in Maidstone, the level was not much greater than other areas on the North Coast and was lower than the previous season.

In eight of the 13 pest and disease (P&D) areas the 2012 damage estimates were at or below the 5-year mean, showing an encouraging decline in damage. Lowest levels of damage were shown in the irrigated northern and Midlands areas, and may be attributed in part to the ability to irrigate crops, so avoiding crop stress which encourages *Eldana* infestations.

Overall, the decline in Eldana larval numbers and damage in the industry is encouraging after the high levels of the previous season. However, in many areas values remain above the LTM and Eldana control practices need continued stringent application by growers in co-operation with LPD&VCCs.
Figure 10. *Eldana saccharina* larval numbers (e/100) (a) and damage as % stalk length red (%SLR) (b) for different pest and disease areas for the 2012 growing season, compared to the 2011 and 2010 seasons and to the five-season mean (LTM, shown as yellow horizontal bars).

**Thrips**
Thrips continues to be a significant pest in the sugarcane industry, and monitoring in the initial outbreak area (Umfolozi MSA) has continued (Figure 11). Thrip counts for the 2012 season (2011/12 summer) were lower than the 2011 season (2010/11 summer). Most notable is the decline in peak numbers since 2007. It is unclear what caused the large drop in numbers.
shown in the summer of 2010/11 and subsequent summers, although the use of the insecticide imidaclorpid has been used over this period for thrips control.

![Figure 11. Long term seasonal trends in thrips populations in the Umfolozi area.](image)

**Grasshoppers**

While grasshoppers have been an episodic pest in the industry over many years, the past season saw major outbreaks in the Empangeni district (Felixton area). In 2012, SASRI initiated two strategies to investigate this problem. The first is aimed at understanding the biology and ecology of the species involved and the second is the appropriate use of insecticides for their control. Results to date suggest that at least five species are present, with the three most common being *Cataloipus zuluensis*, *Petamella prosternalis* and *Nomadacris septemfasciata* (Bam and Conlong, 2012). There is also some evidence that the insecticide deltamethrin has reduced the impact of infestations where applied to grasshopper nymphs \(^2\) (personal communication). Both approaches will continue to be developed to provide effective options for the suppression of grasshopper infestations.

**Diseases**

**Smut**

Smut incidence has declined steadily in recent years with an industry mean of 0.2% stools infected in the 2012 season compared to the 5-year mean of 0.4% (Figure 12a). Prevalence (Figure 12b) was similar to previous years with 24% of the fields inspected being infected to some degree. These reductions can largely be attributed to an improvement in the smut situation in the Amatikulu (ascribed to the replacement of susceptible variety NCo376 with more resistant varieties) and Malelane MSAs. Although smut levels were also substantially lower in Pongola, this was not consistent with previous years and further surveys will be required to confirm the apparent reduction in the disease. Severely infected fields of NCo310 in the Kwajobe district contributed to the high smut levels recorded in Umfolozi. Levels have

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\(^2\) T. Fortmann, SASRI extension
fluctuated in Komati in recent years and incidence and prevalence in the 2012 season were higher than the 5-year mean. The varieties most commonly and severely infected with smut were NCo310, NCo376, N16, N25 and N32.

Figure 12. Smut incidence (a) and prevalence (b) for the 2012 season compared to that of the 2010 and 2011 seasons and to the five-season mean (LTM, shown as yellow horizontal bars).
Mosaic incidence in the industry has remained fairly static at around 0.1% stools infected over the past five years (Figure 13a), and the disease was less prevalent (8% fields infected) (Figure 13b), compared to the previous year and the five year mean. There was a marked increase in mosaic incidence in Maidstone from the five-year average of 0.5 to 1.3% stools infected in 2012 (Figure 13a). Increases were also observed in the Entumeni, Eston and Umzimkulu areas. Varieties most commonly infected were NCo376 and N12. Although mosaic has become less prevalent in Malelane, high levels were recorded in some fields of N19 and N32.

Figure 13. Mosaic incidence (a) and prevalence (b) for different areas for the 2012 season compared to that of the 2010 and 2011 seasons and to the five-season mean (LTM, shown as yellow horizontal bars)
Ratoon stunting disease
Of the 5461 samples from commercial fields for ratoon stunting disease (RSD), tested in the 2012 season, 11% were found to be infected. This is 1% higher than the 2011 season and 2% higher than the five-year mean. The disease was most prevalent in the Mpumalanga, Pongola, Entumeni and Maidstone MSAs, with more than 15% of the samples testing positive in each area. However, most of these areas showed an apparent decrease in prevalence compared to the previous season, apart from Mpumalanga, where levels rose from 14 to 18%.

Rust
Climatic conditions once again favoured the development of brown rust (*Puccinia melanocephala*) in the 2012 season. The disease was common, and in some cases severe, on varieties N37 and N39. Moderate to severe infections were also observed in some fields of N42, particularly during the autumn months in 2012. African rust was widespread, but was most common and severe in Pongola and Midlands North.

Soil health
Increasing soil acidity levels have long been a concern in the rainfed areas (in irrigated areas, soils are generally of high base status, and therefore acidity is not a constraint). Meyer *et al.* (1998) reported that average industry soil pH (measured in water) declined from 6.17 to 5.61 from 1980 to 1996. During the past two years there has been a focus on the inimical effects of excessive soil acidity in production systems. In particular, the negative effects of subsoil acidity on root development were highlighted. Workshops were conducted with growers, with a view to elucidating the nature of acidity problems and the most effective means of correcting them. Grower response has been positive, and large numbers of top and subsoil samples have been submitted to SASRI’s Fertiliser Advisory Service (FAS) for analysis. Data presented in Table 1 provide some indication of the extent of the acidity problems in the rainfed areas, with some 50% of subsoil profiles containing excessive acidity. Correction of these and other nutritional problems will undoubtedly improve production in years to come.

Table 1. Soil samples from the rainfed mill supply areas for the period 1 Jan 2012 to 28 Feb 2013 analysed by the Fertiliser Advisory Service, with percentage samples reflecting the need for amelioration of excessive acidity.

<table>
<thead>
<tr>
<th>MSA</th>
<th>No. of topsoil samples</th>
<th>Topsoils requiring amelioration (%)</th>
<th>No. of subsoil samples</th>
<th>Subsoils requiring amelioration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eston</td>
<td>1133</td>
<td>37.3</td>
<td>292</td>
<td>51.7</td>
</tr>
<tr>
<td>Umzimkulu</td>
<td>554</td>
<td>42.1</td>
<td>53</td>
<td>49.1</td>
</tr>
<tr>
<td>Noodsberg/UCL</td>
<td>1124</td>
<td>37.3</td>
<td>149</td>
<td>57.7</td>
</tr>
<tr>
<td>Sezela</td>
<td>937</td>
<td>41.4</td>
<td>49</td>
<td>26.5</td>
</tr>
<tr>
<td>Amatikulu</td>
<td>1313</td>
<td>34.7</td>
<td>190</td>
<td>68.9</td>
</tr>
<tr>
<td>Felixton</td>
<td>961</td>
<td>19.7</td>
<td>116</td>
<td>32.8</td>
</tr>
<tr>
<td>Gledhow/Darnall/Maidstone</td>
<td>1929</td>
<td>39.5</td>
<td>270</td>
<td>64.8</td>
</tr>
</tbody>
</table>

Farm economics
Figure 14 shows the long term trend in the profitability of a typical rainfed commercial sugarcane farming enterprise. A shortfall (negative returns on cost of capital and production cost) started developing in the 2003 season and has persisted to some extent up to the 2012 season. In 2012 the shortfall decreased slightly, with gross income increasing to marginally more than production costs.
Production costs increased nominally on average by 10.8% (weighted average excluding management allowance) from the 2011 to the 2012 season. Price increases of all cost items were well above the increase in the consumer price index (CPI), with the costs of herbicides, fuel and electricity rising the most (Table 2). Gross income in 2012 is projected to have increased by 12.45% from 2011 based on a 5.9% increase in the price of recoverable value (RV) in tons (a measure according to which growers are paid for cane in South Africa – see Groom, 1999), and a 7% increase in sugar production due mainly to an improvement in cane quality compared to the poor quality of the 2011 season (Figure 6).

Table 2. Changes in income and input costs (adapted from DAFF, 2012).

<table>
<thead>
<tr>
<th>Category</th>
<th>2011 (%)</th>
<th>2012 (%)</th>
<th>2013 (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm staff: Wages</td>
<td>4.5</td>
<td>9.4</td>
<td>37.6</td>
</tr>
<tr>
<td>Farm staff: Rations</td>
<td>6.9</td>
<td>7.3</td>
<td>6.0</td>
</tr>
<tr>
<td>Herbicides</td>
<td>10.9</td>
<td>37.3</td>
<td>12.0</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>23.6</td>
<td>14.2</td>
<td>12.0</td>
</tr>
<tr>
<td>Fuels and lubricants</td>
<td>5.2</td>
<td>16.1</td>
<td>6.4</td>
</tr>
<tr>
<td>Mechanical maintenance</td>
<td>14.1</td>
<td>10.2</td>
<td>6.0</td>
</tr>
<tr>
<td>General maintenance</td>
<td>5.9</td>
<td>9.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Sundries</td>
<td>12.2</td>
<td>14.5</td>
<td>6.0</td>
</tr>
<tr>
<td>Contracting</td>
<td>12.0</td>
<td>9.0</td>
<td>44.8</td>
</tr>
<tr>
<td>Electricity</td>
<td>25.3</td>
<td>16.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

*Projected
The increase in RV price was brought about by a combination of factors (Table 3). Industry sugar production increased from the low levels of 2010 and 2011. Local market demand increased steadily and high world market prices prevailed in 2011 and 2012, due to a deficit in world sugar production. A weaker R/US$ exchange rate also contributed by increasing the value of exports. A small decrease in the RV price is projected for 2013, following expectation of a lower world price and a decrease in local demand (Table 3).

Table 3. Recoverable value (RV) price and RV price determinants (source: SACGA, 2013b).

<table>
<thead>
<tr>
<th>Season</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross sugar production (tons)</td>
<td>1 919 116</td>
<td>1 832 438</td>
<td>1 961 031</td>
<td>2 194 000</td>
</tr>
<tr>
<td>Local market demand (tons)</td>
<td>1 583 456</td>
<td>1 685 312</td>
<td>1 701 731</td>
<td>1 585 600</td>
</tr>
<tr>
<td>#11 World Price (USc/lb)</td>
<td>17.41</td>
<td>28.44</td>
<td>25.62</td>
<td>18.35</td>
</tr>
<tr>
<td>R/US$ exchange rate</td>
<td>7.53</td>
<td>7.35</td>
<td>8.32</td>
<td>8.80</td>
</tr>
<tr>
<td>RV price (R/ton)</td>
<td>2572.14</td>
<td>3017.51</td>
<td>3197.32</td>
<td>3152.48</td>
</tr>
</tbody>
</table>

*Forecast projections

Although the shortfall decreased from 2011 to 2012 (Figure 14), it is expected to increase dramatically in 2013 due to a declining real income and marked increases in production costs (Table 2). Most input costs are expected to increase in 2013 by more than the CPI increase, and two items in particular are expected to increase dramatically, namely staff wages and contracting (Table 2). This is the result of an increase in the minimum wages to R105/day, as announced by the Department of Labour. This will have a knock-on effect in that other staff will need commensurate remuneration to recognise skill levels. The increase in electricity tariffs proposed by the National Energy Regulator of South Africa (NERSA) will also have a marked impact on growers’ profitability, especially for irrigated sugarcane production. The fact that profitability of sugarcane production has been under pressure since 2003 will limit the capacity of growers to survive this dire economic outlook.

Discussion

Model simulations suggest that the decline in actual yields in Malelane was caused mainly by climate (Figure 15). The bigger decline in actual yields for the Komati MSA may have been caused by very low yields achieved by small-scale growers using dilapidated irrigation systems (3 personal communication). Smut levels were also higher in 2012 than in 2011 in this MSA (Figure 12).

Pongola yields were very similar to that in 2011, despite a lower simulated climate potential (Figure 15). This is ascribed to improved irrigation practices in the 2012 winter when a 50% restriction was in place, as well as a larger proportion of young ratoons due to a replanting programme (4 personal communication).

Umfolozi yields declined substantially in 2012, despite an increase in climatic potential (Figure 15). Irrigation water supply was restricted, and heavy but irregular rainfall events probably caused nutrient deficiencies in the crop (5 personal communication).

3 P. Cronje, TSB, Malelane  
4 M. Adendorff, SASRI extension, Pongola  
5 A. Searle, SASRI extension, Mtubatuba
Yields for Felixton and Amatikulu also decreased from 2011 and these decreases were more than the model predicted (Figure 15), suggesting that non-climatic factors could have played a role. Eldana levels declined from 2011 but are still above the 5-year mean for both MSAs (Figure 9).

Yields increased in the Darnall and Gledhow MSAs and decreased slightly in the Maidstone MSA. These changes correspond to calculated changes in the climatic potential for these areas (Figure 14). The incidence of mosaic is fairly high in the Maidstone MSA (see Figure 13) and could have been a contributing factor to the low yields.

All three Midlands MSAs showed significant increases in yield from the low 2011 levels to above the 5-year mean. These can be explained by climate factors (rainfall in particular) being more favourable (Figure 15).

South Coast MSAs showed increased yields from 2011 to levels close to, or above, the 5-year mean. This seems to have been made possible by an improvement in climatic conditions (Figure 15). Problems were experienced in establishing new cane because of a very wet November in 2011, and a dry spell in January and February of 2012 (personal communication). Sezela also experienced localised crop damage due to hail and severe frost (personal communication).

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6 D. McElligot, J. Bowley, SASRI extension
7 D. McElligot, SASRI extension
For the majority of mills the cane quality was good for the first four months of the milling season (at or above the five-year mean and much better than 2011), due to dry conditions that promoted sucrose accumulation and effective harvesting and delivery of the cane to the mill. Thereafter very wet weather and industrial action in the second half of the season interrupted harvest operations, which caused cane deterioration and unusually large amounts of extraneous matter in cane deliveries. On top of that, the milling season had to be extended well into December, when conditions favoured rapid cane growth rather than sugar accumulation. Extraordinary amounts of cane, scheduled for harvest in 2012, had to be carried over to 2013, for most mills. The seasonal patterns of cane quality and harvest conditions that prevailed in Amatikulu are illustrated in Figures 16 and 17, as an example. Other mills experienced similar conditions to some degree.

The overall effect was that, although seasonal average cane quality was better than the very poor quality of 2012, it was still below the five-year mean for most mills. The exceptions were Mpumalanga MSAs and Umfolozi, where seasonal estimated recoverable crystal (ERC) contents were lower than that of the 2011 season. The three Midlands MSAs and Pongola produced a seasonal average ERC content close to the five-year mean. The good performance in Pongola is ascribed to the 4800 ha of cane that was chemically ripened (2000 ha more than in 2012), as well as good drying-off practices (8 personal communication).

The question can be asked whether some of the consequences of late season wet weather could have been prevented. SAWS forecasts for spring rainfall issued in June and July were not consistent and did not clearly suggest above-normal rainfall, so it would have been impossible for the sugarcane supply chain to adjust without prior reliable knowledge of pending wet weather.

Figure 16. Weekly sucrose content of cane stalks (fresh mass basis) for 2012, compared to 2011 and the five-year mean for the Amatikulu mill.

8 M. Adendorff, SASRI extension
Conclusions

The season was characterised by above-normal total rainfall in most parts of the industry. However, rainfall was poorly distributed, with a two-month mid-summer drought and a protracted dry spell in winter. Establishment of newly planted cane was hampered by these dry spells, and the promise of high yield did not materialise because of the dry summer. The dry winter promoted good cane quality for the entire industry for the first half of the milling season. Towards the end of the season very wet weather, exacerbated by industrial strike action, interfered with harvesting and transport operations, causing a sharp drop in cane quality for all mills and limiting the amount of cane that could be crushed in 2012, despite a significant extension of the milling season.

The industry average cane yield was 65.5 t/ha, very similar to that achieved in 2012 and the 5-year mean value. Good yields were achieved in Midlands MSAs, Darnall, Gledhow and South Coast MSAs. Yields for Mpumalanga MSAs and Felixton were disappointing. Yields were mostly driven by climate and water availability, although the study suggests that yields could have been below par for Komati (irrigation inefficiencies on small-scale farms, high smut levels), Umfolozi, Felixton (high Eldana levels), and Amatikulu (high Eldana levels). Subsoil acidity has been identified as a major limiting factor in most regions, and requires urgent measures to mitigate its impacts on crop growth and yields.

Surveys indicated that Eldana levels have declined in most areas from the high levels observed in 2011 after the drought of 2010. However, Eldana levels were still too high in many areas and will require continued control measures.
Although smut levels have declined steadily in recent years, control measures need to be applied routinely to maintain low levels, particularly in smut-prone areas. The prevalence of mosaic in Entumeni, Maidstone and the Midlands is of concern, and mosaic-free seedcane of the older but still popular varieties NCo376 and N12 is scarce. Growers have been encouraged to plant more resistant varieties to manage the disease. It is likely that more growers will apply foliar fungicides in the future, with two different rusts infecting sugarcane in South Africa.

Farm profitability of sugarcane production has declined from 2012 due to higher than inflation-based production cost increases. The expected increases in labour costs from 2013 onwards do not bode well for sugarcane farmers, and drastic measures will have to be taken to limit increases in production costs to remain viable and internationally competitive.

This, and other studies (van den Berg and Singels, 2013), highlighted the poor quality (accuracy and timeliness) of area harvested data at present. This is an important parameter that determines cane yield, a key performance indicator of agriculture production efficiency. It is recommended that the industry revise survey methods and invest in the industry-wide implementation of GIS mapping and remote sensing to improve the quality of data.

The review also highlighted the potential benefits of accurate forecasts of wet weather that could disrupt harvesting operations. Forecasts made before the opening of the milling season could enable a rescheduling of harvesting and milling operations to correspond with drier periods.

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