

## Review

# The concept of sustainable sugarcane production: Global, African and South African perceptions

Mandla S. Mnisi<sup>1</sup> and Cliff S. Dlamini<sup>2\*</sup>

<sup>1</sup>Faculty of Natural and Agriculture Sciences, Centre for Sustainable Agriculture, University of the Free State, South Africa.

<sup>2</sup>Swaziland Institute for Research in Traditional Medicine, Medicinal and Indigenous Food Plants, University of Swaziland, Private Bag 4, Kwaluseni, Swaziland.

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**This paper provides the general information on sugarcane production in relation to its sustainability. The paper starts by discussing sugarcane production at global, continental and national level. Challenges in the sugarcane production arena in South Africa are discussed; these bounce on the poor standard of farming by local commercial farmers and the competitiveness of the industry at the global perspective. Then, it outlines and describes in details the five pillars of suitable agriculture as they apply in sugarcane production. It then ends by highlighting the corporate social responsibility and social acceptance of the sugarcane industry in South Africa which include training and capacity building of locals in elementary and professional skills in sugarcane production.**

**Key words:** Sustainability, production, industry, economic viability, social acceptance.

## INTRODUCTION

### Global sugarcane production

According to Venttore et al. cited in Wikipedia, 2011, sugarcane refers to any six to 37 species of tall perennial grasses of the genus *Saccharum*. The crop is adaptable to the temperature of tropical regions, it has stout, jointed, fibrous stalks that are rich in sugar, and measure two to six meters tall. Sugar cane is an important industrial crop of tropical and subtropical regions and is cultivated on about 23.8 million hectares in more than 90 countries (FAO, 2010 cited in Wikipedia, 2011). Some of the countries that are very dominant in sugarcane production are indicated in Figure 1. Maloa (2001) stated that the sugar industry is attaining new dimensions in the fast changing world. An estimated total of about 45 million sugarcane farmers, their dependents and a large mass of agricultural laborers are involved in sugar cane cultivation, harvesting and ancillary activities, and

constituting 7.5% of the rural population. In India, the sugar industry has been reported to be the focal point for socio-economic development in the rural areas by mobilizing rural resources, generating employment and higher income, and developing transport and communication facilities.

## AREAS OF SUGARCANE PRODUCTION

### Sugarcane production in Africa

Richardson (2010: 6) stated that during the colonial period, sugar production first occurred in the Southern Africa in Mauritius. From there, it spread to Natal (South Africa), Portuguese East Africa (Mozambique) and finally, by the 1930s, Southern Rhodesia (Zimbabwe). However, as South Africa became internationally isolated during the 1960s, the attention of the country's companies turned from further regional expansion to preserving their domestic market share. It was the overturn of apartheid and the agenda of privatization across the continent at large that reinvigorated the expansion of South African capital to countries such as Malawi, Mauritius, Swaziland,

\*Corresponding author. E-mail: [cliffsdlamini@ymail.com](mailto:cliffsdlamini@ymail.com), [csdlamini@uniswa.sz](mailto:csdlamini@uniswa.sz). Tel: +268 6766612. Fax: +268 25185276.

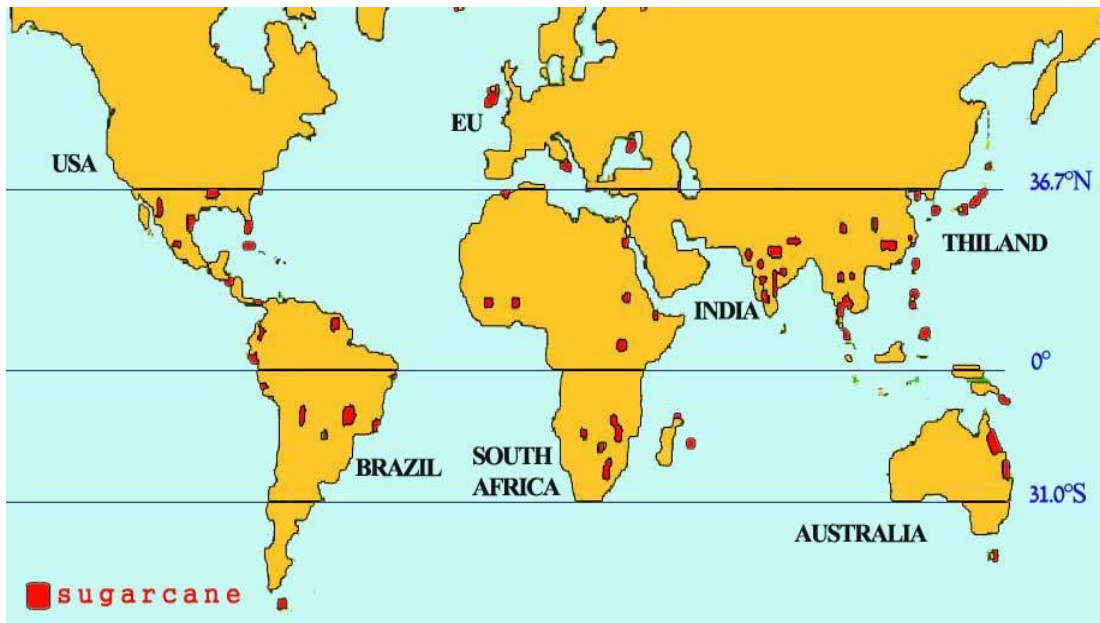


Figure 1. Global sugar cane producing countries (NETAFIM, Israel).

Zambia and Tanzania (Richardson, 2010: 5). Even though the average yield per ha in Africa is as low as about 85% of that of the world, poor countries in Southern Africa are still experiencing something of a boom in sugar cane production (Tarimo and Takamura, 1998). Billions of dollars of investment have been poured into the region- including from UK and French sugar companies – in order to source increasing amounts of sugar for the European (EU) market. According to Richardson (2010: 4) around \$3bn has been earmarked for investment in the sugar cane industries of some of southern Africa's poorest countries in the last decade. However, Greenwood (2010) argued that due to the changes in global market environment particularly for sugar, sugar along with oil, diamonds, cocoa and coltan are commodities produced in Africa that could prove more of a burden than a blessing to the continent.

## SUGARCANE PRODUCTION IN SOUTH AFRICA

### Profile of sugar industry in South Africa

The South African industry produces sugar and molasses for both the local and export market from 15 mills. These mills are supplied from sugar cane grown in KwaZulu-Natal, Mpumalanga and the Eastern Cape. There are about 53, 000 registered cane growers comprising approximately 2000 farmers farming on freehold land and approximately 53, 000 growers farming on Tribal Authority land represented by the SA Cane Growers' Association (Maloa, 2001). Figure 2 shows areas of sugarcane in South Africa. Maloa (2001) further states

that these growers produce approximately 85% of the South African cane crop. About 17% of this is produced by small-scale black growers. SASA (2010) added that with the growth of economic development and empowerment of previously disadvantaged people, the participation of black farmers in sugar cane production is consistently increasing. The 15 mills process this sugar and also produce the remaining 15% of the South African crop from their own land.

The South African Sugar Association (SASA) is a partnership between cane growers and the South African Sugar Millers Association Limited (SASMAL). This partnership provides specialists services in marketing, logistics, research and administration to add value to the cane growing and milling business of the industry. As a result, cane growers are an integral part of the national, international and SADC (Southern African Development Community) sugar policy formulation and in this way, farmers are represented from farm gate, through processing and marketing, to the customer. The industry produces an estimated average of 2.2 million tons of sugar per season. About 60% of this sugar is marketed in the Southern African Customs Union (SACU). The rest is exported to markets in Africa, Asia and the Middle East.

### Challenges of sustainability in the sugar industry

According SASA (2010), most of the small scale farmers and some of the commercial farmers are not adequately equipped with the proper way (sustainable) of sugarcane farming hence, threatening the country's sugar industry's competitiveness in relation to other world class producers



Figure 2. South African sugar cane producing areas (SASA, 2010).

and industries. To address the challenge, the following priorities have been set by SASA, research and technology development that leads to improved farmer productivity infrastructure investment in potential rural areas; development of sustainable farmer institutional formations, targeted human resources development, farmer-friendly policies that are informed by local imperatives and export opportunities, taking care of monopolistic relations in world sugar business market, improved efficiency of capital resources utilization and a conscious management of natural and environmental resources, targeted social and capacity building projects that invest back into the community, and committed government policy to develop the industry within manageable international competitiveness conditions.

According to SASA (2011), the sugar industry's focus on producing a high quality, profitable and cost effective product is complemented by its focus on sustainable development. Since the industry is a major contributor to rural development, an area often neglected in an urbanizing society, therefore, this holistic approach will promote economic transformation, social investment and sustainable environmental practices. In addition to initiatives undertaken by the industry, the South African Cane Grower Association (SACGA) and sugar milling companies undertake development projects and are

involved in broad based black economic empowerment (BBEE) through a range of important initiatives.

### THE CONCEPT OF SUSTAINABLE AGRICULTURE IN SUGARCANE PRODUCTION

Sustainability is the concept that growth and development must take place, and be maintained over time, within the limits set by natural ecosystems. Sustainable agriculture is not a return to pre-industrial methods but a combination of traditional and modern techniques. Sustainability is to leave future generations as many, if not more, opportunities as we have had ourselves (Serageldin, 1995). Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. Agricultural systems are regarded to be sustainable if they are economically viable, environmentally safe and socially fair. According to Boiffin et al. (2004), such could involve two approaches. The first approach being the protection of productive resources, for example, maintaining soil fertility, protecting groundwater, developing renewable energies, and finding solutions to adapt farming systems to climate change. Second approach is to consider that agriculture also has to

contribute to the sustainability of large territories and social communities. Therefore, because sugarcane production has such significant effects on social development, all industry players in South Africa have focused on its sustainability.

### **Productivity (Maintain or enhance production/services)**

According to Peykani et al. (2010), economical growth requires increase in production, and according to production and supply theories, production growth is possible in one of the two ways of either using more production factors, or use of improved technology along with more efficient utilization of production factors. In principle, productivity addresses the relationship between input and output at micro, sectional or macro levels of the society. In sugarcane production, Bates and Sokhela (2003) stated that the strong and consistent decline of 7% per annum in total small scale grower production since its peak in the mid-1990s is evidence of the challenging cane production environment faced by small scale growers. The decline in productivity has been attributed to the withdrawal of inputs and services by certain milling companies after the restructuring of the two-tiered quota payment system, and by declining profitability of cane production.

In addition, scientists and researchers state that the main reasons for sugar cane and sugar yield decline are the global climatic changes, environment deterioration, lag in technology extensions, less inputs, lack of proper crop, insect and disease management, absence of breakthrough in breeding programs resulting in mono-cropping of sugar cane variety, loss of interest in growers due to less economic profits, marginalization of sugar cane growing areas by other competitive crops, etc. In order to sustain the sugarcane as well as, sugar production and reduce the gaps of yield decline, scientists and researchers suggest the following: breeding resistant sugarcane varieties with high sugar and high productivity, use of healthy seed canes, innovation and popularization of advanced and practical technologies, integrated pest management (IPM) for controlling diseases, insect pests, weeds and rats, recycling of the sugar cane wastes and by-products, etc. Better management practices are most important for sustaining sugar cane production, which includes overall planning, coordination between scientists and farmers, intensification and a large scale of farm running, development and import of advanced practical technologies, setting up mechanisms of early warning and emergency response to disasters, and strengthening international cooperation.

Therefore, the key focus of the sugar industry must therefore, be to improve the level and coordination of support services to small scale growers and new freehold growers in a manner that promotes sustainable land

reform and maintains the economic contribution of the sugar industry toward gross domestic product (GDP), foreign earnings and employment in South Africa, SASA (2009).

### **Reduce the level of production risk (stability)**

Traditional sugarcane management is based on the use of fire prior to harvesting to improve the efficiency of harvesting by hand-cutting, but this also causes loss of organic matter and volatile nutrients (Blair and Crocker, 2000). For economic and legal reasons, mechanical harvesting of sugar cane is increasing in Brazil. This means that around 10 to 15 Mg ha/year can be added to soils, as a consequence of residue incorporation (Graham et al., 2002). About 90% of all South African cane fields are burned at harvest, and the remaining 10% are trash mulched at harvest (South African Cane Growers, 2005). According to Van Antwerpen and Meyer (1996), improper management of soils can lead to damaging changes in soil function, which in turn can lead to yield losses. Water has become an increasingly important determinant of agricultural sustainability, especially, in arid and semi-arid areas of the world. Demand for water is increasing worldwide. Increased water scarcity implies that options for water resource development are becoming limited. Increased agricultural productivity is highly dependent on the status of the natural resource base and social security is also heavily dependent on how these resources are used. The growing water scarcity and the misuse of the available water resources are major threats to sustainable development for the agricultural sector. However, lack of sufficient water in some parts of the world has already impaired sustainability, decreased opportunities and is declining rural society.

According to SASA (2011), the South African Sugar Industry (SASI) promotes sound and sustainable environmental practices within the industry in line with national legislation and international requirements. This is achieved through: knowledge transfer of sugarcane environmental research, including the development of Best Management Practices (BMPs); through South African Sugar Research Institute (SASRI); support of environmental committees located in the sugarcane producing areas; and collaboration with organizations such as the World Wide Fund for Nature (WWF). These interventions promote and facilitate sustainable environmental management.

### **Protect the potential of natural resources and prevent degradation of soil and water quality (protection)**

Despite the fact that current generations bear heavy obligations to look out for the welfare of future

generations, the philosophical case in support of such intergenerational obligations is surprisingly tentative. Furthermore, quantifying any such obligations is subject to even greater uncertainty. Even so, current generations bring future generations into existence in the knowledge that doing so will put a claim on resources that could have been used to reduce suffering among people who are already alive.

The problem of environmental protection and remediation can be cast as a classic trade-off between economic growth and ecological protection. Compaction as one of the soil degradation processes, although appearing to be a relatively simple concept, is in fact a most complex soil feature having significant inter-relationships with most of the recognized physical, chemical and biological properties of soils as well as, with environmental factors such as climate. Sugar cane production considered as one of the agricultural industries that causes a big impact in soil degradation since its harvesting is done by heavy duty trucks (+ 30 tons-truck). According to Pearce and Warford (1993) increasing human population, decreasing resources, social instability, and environmental degradation pose serious threats to the natural processes that sustain the global ecosphere and life on earth.

Agriculture and society in general, is challenged to develop strategies for sustainability that conserve non-renewable natural resources such as soil, enhance use of renewable resources, and are aligned with the natural processes that sustain life on earth. The recent acceleration of technological growth in industrial and post industrial societies poses a risk to the health of global ecosystems which are characteristically slow to change.

Sugar cane growers acknowledge the importance of the soil's contribution to optimal yields. Van Antwerpen and Meyer (1996) regards soil quality as the condition of a soil reflecting climatic conditions and applied management options over an extended period of time. Improper management of soils can lead to damaging changes in soil function, which in turn can lead to yield losses. Although, growers often optimize yields using appropriate management strategies and targeted application of inputs, there is a need to quantify the condition of soils. Evaluation framework should be in place to identify problematic or potentially problematic fields and to formalize sound corrective recommendations.

Global climate change, depletion of the protective ozone layer, serious declines in species biodiversity, and degradation and loss of productive agricultural land are among the most pressing concerns associated with our technological search for a higher standard of living for ever-growing human populations. Bates and Kundzewicz (2008) state that in the coming decades, climate change impacts will drastically affect one of our most precious resources: high quality water. Indeed, we are already experiencing the impacts of climate change. Climate

change impacts affect water regimes at global and local hydrological scales, impacting both quantity and quality of available water. Soil health can be defined as the continued capacity of soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain biological productivity, maintain the quality of air and water environments, and promote plant, animal, and human health.

According to World Bank Group (2007), the sugar industry has high water consumption and generates great amounts of wastewater with large quantities of suspended solids and organic matter. Many sugar cane mills, additionally, to the processes for raw and refined sugar production, have cane molasses based distilleries for ethanol production. The waste of these plants, called vinasse, is very concentrated, highly polluting and contains non-biodegradable organic matter. Many mills have implemented only solid separation pretreatment facilities with clarifiers or dissolved flotation systems. These facilities have to be complemented with biological treatment to avoid negative environmental effects in the water receptors. Some mills use the treated water in irrigation of the sugar cane plantations but there are frequent management and clogging problems when the solid separation is not effective.

### **Economic viability**

According to SACGA (2009), the global financial crisis that broke in late 2008 has had widespread impacts on the global economy, including developing countries like South Africa. Other uncertainties within the context of the South African sugar industry include slow implementation of government land reform policies and poor progress in reviewing sugar related legislation. One of the major impacts has been reduced demand for South African exports, particularly, in the mining and manufacturing sectors. Fortunately, there has not been a dramatic effect on sugar markets, although, tightness in the credit market has impacted on access to margin financing and new investments. SASA (2011) confirms that the industry makes an important contribution to the national economy, given its agricultural and industrial investments, foreign exchange earnings, its high employment, and its linkages with major suppliers, support industries and customers. It also states that based on revenue generated through sugar sales in the South African Customs Union (SACU) region as well as, world market exports, the South African sugar industry generates an annual estimated average direct income of R8 billion. This contributes R5.1 billion in value of sugar cane production.

Generally, the economic margins derived from sugarcane agriculture have decreased in real terms, which have caused average farm sizes to increase as farmers chase the benefits of economies of scale. Accordingly, entry into the industry becomes more

challenging and, because potentially young aspiring farmers are attracted to more rewarding industries, the absolute number of farmers is decreasing whilst the average age of farmers is increasing. This trend is expected to continue, (SACGA, 2009). SACGA (2009) also states that it is expected that the sugar industry will be a relatively safe place to even in the period of global economic slowdown simply because sugar demand is strongly linked to population growth. It is comforting, from a global perspective, that sugar demand is strongly correlated to population growth and is therefore, a commodity that might miss the brunt of the global financial crisis. This population growth link also applies to the Southern African Customs Union (SACU) market which in the 2008/2009 season contributed approximately 70% of the revenue used to calculate the industrial Recoverable Value (RV) cane price, SACGA (2009).

Sugar, both globally and locally, is a relatively good economic activity to be associated within the short term to ride out the global economic crisis. Furthermore, the inherent potential of sugarcane to competitively play in the renewable energy arena is an exciting prospect for the future. There is no much that the current South African sugar industry stakeholders can do about the global economic situation, but they can influence the investment climate within the Sugar African sugar industry, SACGA (2009). According to McCarthy (2007), the South African sugar industry is significant in the scale of its contributions to GDP, employment and foreign exchange earnings in South Africa. More specifically the sugar industry contributes between 0.5 to 0.7% of national GDP, 0.5% of total income tax, 3.6% of total fixed capital stock of business enterprises, and 0.3% of salaries and wages. Farmers are switching to sugar cane production, increasing the importance of the economical analysis of the activity.

### **Social acceptance**

Corporate social responsibility (CSR) is a relatively new term that arose as a result of the changes taking place in the economic environment. The concept is not a new thing, however, as this approach has long been a feature of cooperative societies. In the business community, CSR has emerged as a significant theme underpinning moral, financial, and ethical judgments of corporate activity. The growing emphasis on social responsibility has affected the relationship between companies and their various stakeholders, and there is little agreement among scholars on either the causes or effects of socially advocated programs or what societal impacts may be seen as a result of CSR initiatives. CSR is a company's commitment to minimizing or eliminating any harmful effects and maximizing its long-run beneficial impact on society. Socially responsible behavior then may include various activities ranging from supporting nonprofits,

employee well-being, to environment and human right issues. Brietbarth and Harris (2008) emphasized that this engagement is a result of CSR having the potential to offer strategic direction to managers who want to enhance their organization's performance and competitiveness. Currently, having already realized that the corporate social responsibility plays an important role in establishing good social images and improving the international competitiveness, many large enterprises try to conduct their production and operation according to the international standards of corporate social responsibility.

McCarthy (2007), states that the sugar industry directly accounts for 10.9% of all agricultural employment and 1.3% of national employment. After considering the sugar industry's many linkages, direct and indirect employment amounts to 2.5% of national employment. According to Bates and Sokhela (2003), the sugar industry also has a long history in promoting and supporting cane production by small scale growers in communal areas. According to SASA (2009), the sugar industry is committed to supporting Government's target to transfer 30% of commercially owned farm land to previously disadvantaged South Africans by 2014, and to Broad Based Black Economic Empowerment (BBBEE). The sugar industry has made steady progress with transformation of commercially owned cane land since 1994.

The sugar industry provides direct employment in cane production and processing, and indirect employment in numerous support industries in the three provinces where sugarcane is grown and processed, namely KwaZulu-Natal, Mpumalanga and Eastern Cape, (SASA, 2011). Direct employment within the industry is approximately 79, 000 jobs, which represents a significant percentage of the total agricultural workforce in South Africa. Indirect employment is estimated at 350, 000.

SASA (2011) confirms that the sugar industry's involvement in social investment includes projects in the areas of Enterprise Development, Health and Welfare, and Human Resource Development. The industry is involved in numerous projects such as the provision of seed funding to assist rural black women, youth and commodities to establish co-operatives and to access economic opportunities. SASA (2011) further added that the enterprise development programmes seek to accelerate people's access to employment opportunities and increase their participation in the mainstream economy.

According to SASA (2011), the staggering challenge of poverty, HIV and AIDS, unemployment and household food insecurity not only affects the quality of life of the indigent, but it also threatens the social stability of these vulnerable communities. Meeting these challenges is a priority of the sugar industry. The industry works in partnership with non-governmental organizations supporting vulnerable communities in order to respond to these issues. SASA (2011) further adds that human



resource development is a major area of social investment for the sugar industry. The sugar industry trust fund for education (SITFE) was launched in 1965 as a private sector initiative, and is one of South Africa's oldest education and training programmes. To date, SITFE has provided bursaries to more than 9, 000 students, and financed school building projects, given assistance to tertiary institutions, and worked with community-based educational authorities to improve overall education standards.

The SASA Shukela Training Centre (Pty) Limited is a wholly owned subsidiary of the SASI Shukela Training Centre (STC) and a provider of agricultural and engineering training. Based in Mount Edgecombe, with on-campus accommodation, this Institute of Occupational Excellence, so conferred by the AgriSETA, provides training in a wide selection of trades and is a registered decentralized Trade Test Centre. In 2009, over 300 artisans qualified at STC and 27 learners qualified in the Plant Production Learnership at National Qualification Forum (NQF) 4. Many small-scale and new farmers, including farm workers, receive sugarcane husbandry skills training, (SASA, 2011).

Research conducted by the South African Sugarcane Research Institute (SASRI) contributes to the profitability and sustainability of the industry whilst encouraging environmentally response farming practices. The South African Sugar Association's Nutrition Department has developed a programme to communicate science-based information on the role of sugar as part of a balanced diet and healthy lifestyle to health and education professionals and the wider public, (SASA, 2011).

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