IMPORTANCE OF SUGARCANE FARMING AND INDUSTRY ON THE ISLAND OF MAURITIUS

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Abstract. *Sugarcane (Saccharum officinarum) is a perennial plant native to the tropic areas. Generally, the largest areas of sugarcane are located in the Americas (Brazil, Mexico, Columbia, USA, Cuba) and Asia (India, China, Thailand, and Pakistan). Sugarcane is one of the most important crops on the Island of Mauritius and represents 85% of the arable land and 45% of the total land area of the island. Although Mauritius is one of the large sugar producers, its production has fallen in the recent 20 years. In 2000 the area with sugarcane was around 73 000 ha and decreased to around 45 000 ha. An economically viable technology has to be developed for the complete package of sugarcane main product (sucrose) and waste. In Mauritius bagasse as waste from sugarcane is used to produce electricity. But these power stations work only for around 6 months during sugarcane harvest season. It could be optimised by burning other biofuels like wood and be operational over the whole year. After burning bagasse, the problem with the disposal of ash that is generated. Also, there is alcohol produced from the waste known as molasses, but the problem is with the utilization of the final waste which is vinasse. It can be encouraged to use these wastes and maybe this approach can have a positive influence on increasing areas with sugarcane in Mauritius.*

Keywords: *Sugar cane, sugar, industry, farming, Mauritius.*

INTRODUCTION

Sucrose is found naturally in honey, dates, and sugar maple sap, but it is most concentrated in sugarcane and sugar beets. Over the world, sugarcane and sugar beet represent the main crops for sugar extraction (MACKOVÁ, 2019). They are not competitive species, because they are produced in different agroecological conditions (VERHEYE, 2010; Bakker, 2012; HABIB et al., 2014; VARGA et al. 2020; KRISTEK et al., 2020). The ratio of sugar produced from sugarcane and sugar beet is 80:20 (VARGA et al., 2021).

Sugarcane (*Saccharum officinarum*), is a perennial plant from the family *Poaceae* and is native to the tropic areas of southeast Asia. Different varieties are grown worldwide in warm and humid areas (approximately between 30° south and 35° north latitude) to obtain sugar. The stem is 2 to 6 cm in diameter, grows 1.5 to 4 m in height, and in favourable conditions up to 7 m. A stalk without leaves and tops is used to obtain sugar. The sugar is extracted from the sweet juice of the heart, which contains 14 to 20% of it (PAPINI-TERZI, 2009; PEREIRA et al., 2017). After extraction and crystallization of the sugar remain → molasses. Two types of sugar are obtained from it with special technologies: light and dark (brown) sugar.

Sugarcane is one of the fruits with remarkable economic potential (SMOLÍK, 2018). There are almost no waste products in the production of sugar from sugarcane and the energy consumption is minimal. Ethanol is also produced from sugarcane and the remnants of the stem, called bagasse, are left in the air to dry and then serve as a heating fuel in the process of obtaining sugar or obtaining electrical energy in thermal power plants. It can also be used as a feed additive for livestock (DOTANIYA, et al., 2016).

MATERIAL AND METHODS

The issues, regarding the importance of sugarcane farming and keeping the sugar industry functional on Mauritius are widely known on the island of Mauritius., but is it rarely discussed abroad, especially in Europe. The aim of this paper was to analyse the current state of sugarcane farming and the sugar industry on Mauritius mostly through statistical data and information as well as scientific research and published work.

The methodological basis of this paper are general scientific methods of cognition, analysis and synthesis, which allow revealing the genesis and current state of the country's sugarcane farming and industry.

RESULTS AND DISCUSSION

Production sugarcane in the world

The largest areas of sugarcane are located in the Americas and Asia (Figure 1). According to FAOSTAT (2021) in the 20-years period from 2000 to 2019 the largest producers were Brazil (over 604 million tonnes) occupies the highest sugarcane-growing area, followed by India (over 320 million tonnes), China (over 104 million tonnes), Thailand (over 80 million tonnes), Pakistan (over 57 million tonnes) and Mexico (over 57 million tonnes).

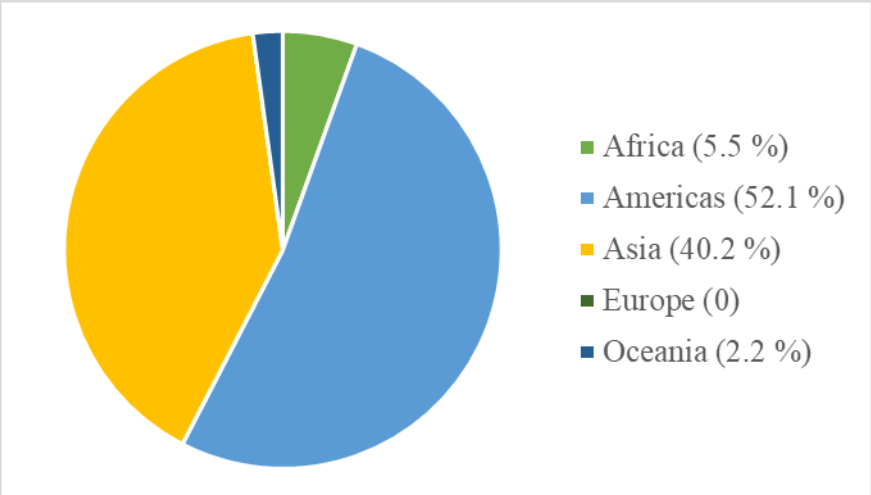

Fig. 1. Production share of Sugarcane by region (Average 2000 – 2019) (FAOSTAT, 2021)

History of sugarcane production on Mauritius

The Republic of Mauritius is a small island country in the Indian Ocean, 950 km to the east of Madagascar. It has a land surface area of 1865 km^2 and is volcanic in origin with a central plateau surrounded by mountain ranges and plains (FISCHER et al., 2013).

The history of the sugar industry on Mauritius dates to the last few years of the 17th century. According to JAMES (2004) in Europe sugar was a luxury up until the early 18th century. It is only since the Caribbean islands and tropical north and south Americas were colonised by Europeans, that sugar became available on the world market in a large enough quantity and at acceptable prices for everyday use. In England, the yearly per capita consumption increased 20 times from the 1660s to 1775, and a further five times from 1835 to 1935. With the increasing popularity of tea, there were more opportunities to use sugar.

Sugarcane (Picture 1) was the first cash crop introduced on Mauritius by the Dutch, who initially used it to make an alcoholic beverage called "arrack." Mauritius, once of great importance to the British Empire as a strategic outpost in the Indian Ocean, was very significant as a leading source for raw sugar and its export to Great Britain and Northern Ireland (ROBERTSON, 1930).

Picture 1. Mauritius Sugarcane Industry Research Institute, Réduit Sugarcane Research Station, Mauritius (Original)

Farm production of sugarcane on Mauritius

On Mauritius, the main crops are sugarcane, vegetables (tomatoes, cucumbers, eggplants, green vegetables, etc.), fruits (pineapples, citrus, bananas, coconuts, lychees, longans, mangoes), roots, and tuberous crops (cassava, potato) (Picture 2). Climatic conditions such as rainfall, temperature, and solar radiation are the main drivers of biomass synthesis and accumulation. On average, the temperature has increased over Mauritius by 0.7°C to 1.2°C since 1950 coupled with a decrease in annual rainfall of 63 mm per decade (MSIRI, 2016). It sure will be necessary to provide modern irrigation systems in the future for annual crops (JUKIĆ et al., 2019; GALIĆ ŠUBAŠIĆ et al., 2020) and efficient water use during the dry seasons. Over the years there has been an increase in urban development, but also several agricultural lands are being converted to residential areas, with the highest encroachment over sugarcane fields.

Sugar is the single most important sector in the Mauritian economy today. KWONG (2005) states that sugarcane represents 85% of the arable land on Mauritius. On average, from 400 000 to 600 000 tonnes of sugar are produced annually with most (530 000 tonnes) of the sugar being exported to the European Union. According to FAOSTAT (2021), the area with sugarcane in Mauritius has decreased in the last 20 years (Figure 1). In 2000 the area with sugarcane was around 73 000 ha and decreased to around 45 000 ha. Some remote, marginal small-scale sugar areas were left fallow, and subsequently abandoned and converted back to grass and scrubland (FISCHER et al., 2013). According to MSIRI (2016), the Mauritian sugar industry proposed to convert into a cane cluster following the European Union (EU) Sugar Regime reform whereby the guaranteed preferential access to the EU, as well as the guaranteed minimum price, had been revised with a consequent drop of 36% in sugar prices. This had a huge influence on areas decrement. The Government of Mauritius drew up a draft

'Restructuration Program' for the sugar sector in April 1984. The 'Restructuration' program aimed to monitor the long-term financial viability of the large estates, rationalise milling operations on a national scale and rehabilitate and modernize factory equipment, raise the productivity of small planters, improve the utilization of the industry's by-products, and diversify its activities in terms of food production and other agriculture (Report No. 5812-MAS, 1986).

Picture 2. Some of the main fruit crops of the Island of Mauritius
(left - pineapple plantation and right - banana trees) (Original)

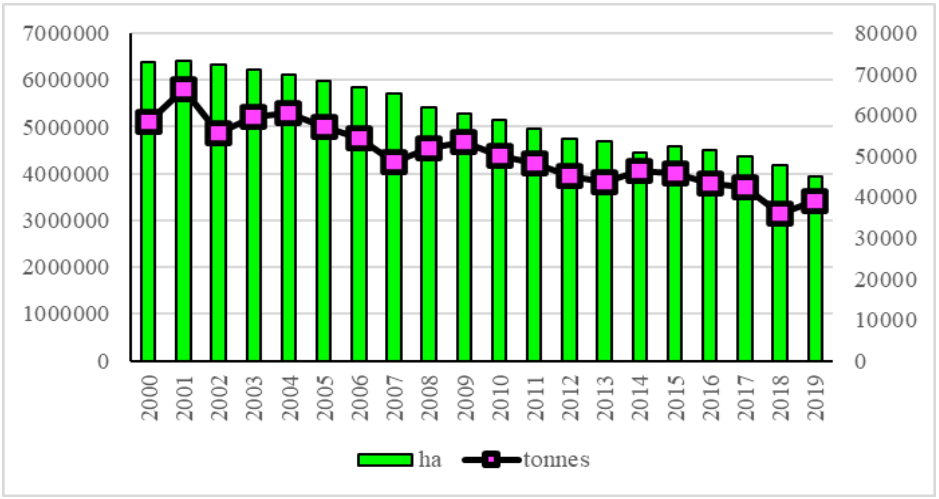

Fig. 2. Sugarcane area harvested and total production on Mauritius from 2000 to 2019 (FAOSTAT 2021)

Sugarcane mills on Mauritius

The sugarcane industry on Mauritius is the main generator for the economy of the Country. Presently, the sugarcane production on Mauritius is estimated to be almost 6 million

tons annually. The sugarcane plantation on Mauritius has spread a massive area covering most of the agricultural land of the country. The sugarcane industry on Mauritius has been gaining vital prominence since the evolution of the sugar industry on Mauritius in the 1960s and has now emerged as a highly competitive market for the country. The sugar mills (Picture 3) are centralized in four strategic parts of the island, with an annual production of around 450,000 tons of sugar annually. At present, the cost of cane sugar production on Mauritius is among the highest due to a low milling capacity (3700 tonnes of cane crushed per day by the 3 existing mills), a short milling season (an average of only 132 days per year), a high ratio of labour to total production costs with field labour making up 80% of the total labour costs (KWONG, 2005).

Picture 3. Map of Operational sugarcane mills on Mauritius (Original)

Products of human consumption

Except for the crystallised sucrose there are some other important products in human consumption. Cane syrups are dark golden brown in colour, with medium flavour intensity (caramel, butterscotch, cane and green flavours (CLARKE, 2003). The cane syrup is used on pancakes, biscuits, and cereals and in cooking.

Another important product is cane juice (Picture 4). Sugarcane juice is used to cure several types of human diseases in different parts of the world. It has been used in Ayurveda and Unani systems of medicine in India since time immemorial either as a single drug or in combination with other plant products (CHINNADURAI, 2017). It is consumed as a beverage in

many places, especially where sugarcane is commercially grown, over Mauritius. Sugarcane juice is obtained by crushing peeled sugarcane. For food industry use, cane syrups are produced at sugarcane Near every public beach or on every tourist spot on Mauritius, you can see sugarcane syrup vendors, selling to tourists (and locals as well) their traditional sugarcane syrup or sugarcane juice. The price of 1 cup is around 1 EUR. Sugarcane syrup is extracted from pressed sugarcane. It is consumed as a beverage, especially since sugarcane is commercially grown on a large scale all around the island. The syrup is very sweet, considering the high content of sugar within sugarcane, so it is usually mixed with lemon juice and some water to create a sugarcane juice.

Picture 4. Sugarcane juice (Original)

CONCLUSIONS

Sugarcane is one of the most important crops of the Island of Mauritius and represents 85% of the arable land on the island. In order to increase sugarcane production on Mauritius, more incentives are required to support farmers and their production costs, combined with fixed minimum domestic sugar prices. Since global warming is impacting agriculture around the world, the need for irrigation systems will be necessary, not only for sugarcane but also for other crops of Mauritius as well.

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