

# OVERVIEW OF RÉUNION SUGAR INDUSTRY

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## Abstract

On Réunion Island, the sugar industry plays an important role in the agricultural sector, not only in terms of production and export revenue, but also in regard to the number of people it employs. The sugar industry accounts for 27% of the agricultural production on the island, and provides a source of income for 5000 small-scale farmers. Sugarcane covers 26 500 hectares, and around 2 million tons of sugarcane is crushed each year by the two mills on the island. Moreover, sugarcane plays a significant environmental role as it helps to reduce soil erosion and to treat livestock effluent. It also provides energy resources in the form of 22% of the island's electricity and as most of the crop is harvested as green cane, it contributes to green tourism and landscape quality.

However, over the past 10 years, the Réunion sugar industry has had to face the difficulties of available arable land decreasing because of urbanisation, an increase in production costs, strong currency and environmental pressures. The industry is thus looking for solutions that will improve profitability while dealing with difficult conditions such as steep slopes that limit mechanisation, the large diversity in farm sizes and production systems, and stricter environmental regulations.

Although the industry is highly subsidised, permanent expansion and efforts have been made to maintain the industry. Technical, organisational and economic solutions have been developed in terms of mechanisation, transport costs, varieties adapted to various climatic conditions, irrigation and regional planning. This paper gives a detailed overview in this context and its perspective.

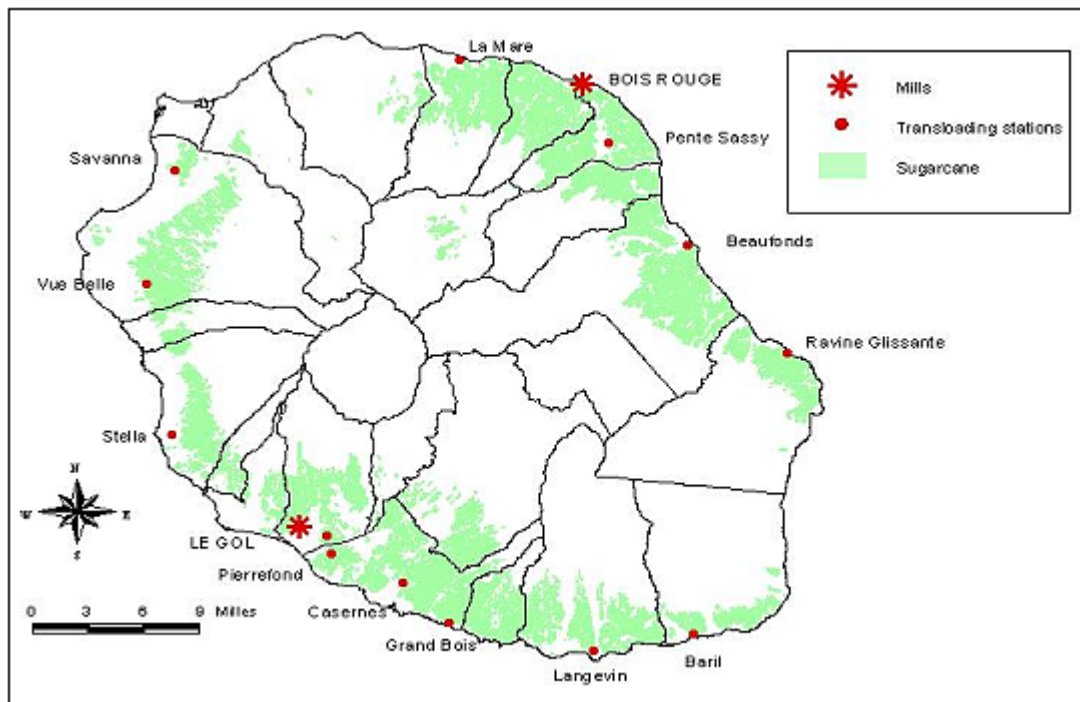
*Keywords:* sugarcane, Réunion Island, production, co-generation, green cane harvesting, smallholder farmers

## Introduction

On Réunion Island, one out of two farmers grows sugarcane. About 5000 smallholder farmers cultivate 26 500 hectares of sugarcane and produce almost two million tons of cane each year. Sugarcane covers 54% of agricultural land and is grown on the outer edges of the island (Figure 1). It is processed by two mills to produce an approximate annual output of 200 000 tons of sugar.

As the cane sugar industry needs a minimum of two million tons of cane to be cost effective, it has reached its profitability threshold. To maintain the industry, the major challenges are to produce 2.5 million tons of cane and to increase the growing area to 30 000 hectares. To meet these challenges, efforts and improvements have been done by millers, farmers and all the industry stakeholders.

This paper presents (1) the specificities of Réunion sugarcane production (2) the sugar industry economic, social and environmental role (3) its main issues (4) efforts and improvements which have been made to maintain the industry.



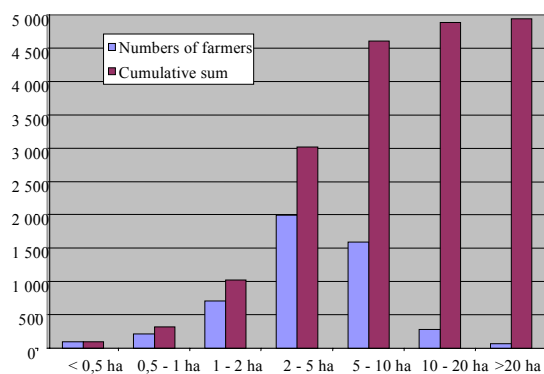
**Figure 1. Mill supply areas and transloading stations.**

### Réunion sugarcane production: a high majority of smallholder farmers

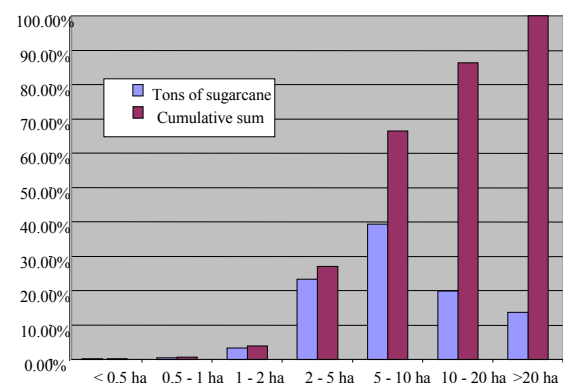
#### *Diversity of farms*

The average farm size is 5 hectares. Although farm size can vary from less than one to 1800 ha, 90% of the farms are less than 10 ha in size. In 2002, farms ranging between 5 and 20 ha represented 45% of the island's agricultural land.

Sugarcane production is not uniformly distributed between farms. Fifty per cent of the farmers delivered only 26% of the total sugarcane production, whereas 10% produced 35% of the total crop (see Figures 2 and 3).



**Figure 2. Distribution of growers by farm size (2002).**



**Figure 3. Cane production by farm size (2002).**

The majority of farmers are smallholders with 5 ha or less; however, their numbers have decreased by 50% over the past 10 years. Most farmers have diversified into market gardening, arboriculture or cattle breeding. Although their production represents only a small portion of the total sugarcane crop, they play an important role in the sustainability of the sugarcane industry, because the sugar and rum industries need a minimum of two million tons of cane annually to be cost effective. Considering the pressures of urbanisation and loss of agricultural land, it is essential not to lose more, even marginal land.

#### *A wide range of crop production systems*

The diverse climatic conditions on the island lead to large variations in crop production systems. Significant differences occur between the northern and southern parts of the island, and between the lowlands and the highlands. The average annual rainfall varies from 500 mm on the west coast to 5 000 mm on the east coast. Sugarcane is grown from sea level to an altitude of 1 000 m. In addition, most of the drought zones are cropped under irrigation and 21% of total sugarcane area is irrigated.

Average yields are around 70 t/ha, but are generally higher in the east (83 t/ha in 2000) than in the west (65 t/ha) (Pariante, 2002).

In the east and the north, cloudiness and slopes limit sugarcane growth at altitudes of more than 400 m (less than 5% of the farms are higher). On this part of the island the farms are usually larger (average 6.9 ha), they are not diversified and 10% of the area is mechanised.

In the west of the island, 64% of the sugarcane is grown below 400 m. Average yields in the non-irrigated zones can be very low (40 t/ha), and large differences can be seen between lowlands and highlands and between irrigated and non-irrigated zones.

In the south, 28% of the sugarcane is grown in the highlands, and 80% of the irrigated zone is situated in this southern area. Although the average size of the farms in the south is under 5 ha, because they are irrigated, average yields can reach 80 t/ha.

#### *Mill supply organisation*

The harvesting season runs from mid-June to December. The two mill supply areas are divided into 12 delivery zones (plus 2, depending to the mills) (see Figure 1). Each zone has a transloading station to which growers deliver their cane. Here deliveries are weighed and cane quality is measured. Deliveries are sampled and processed by a specialised body, the CTICS, which is an inter-professional body for sugar and sugarcane. The cane is then transported by hauliers from the transloading station to the mill.

### **Value of sugarcane on Réunion Island**

The sugar industry plays an important role in the agricultural sector, not only in terms of production and export revenue, but also in terms of employments and environment.

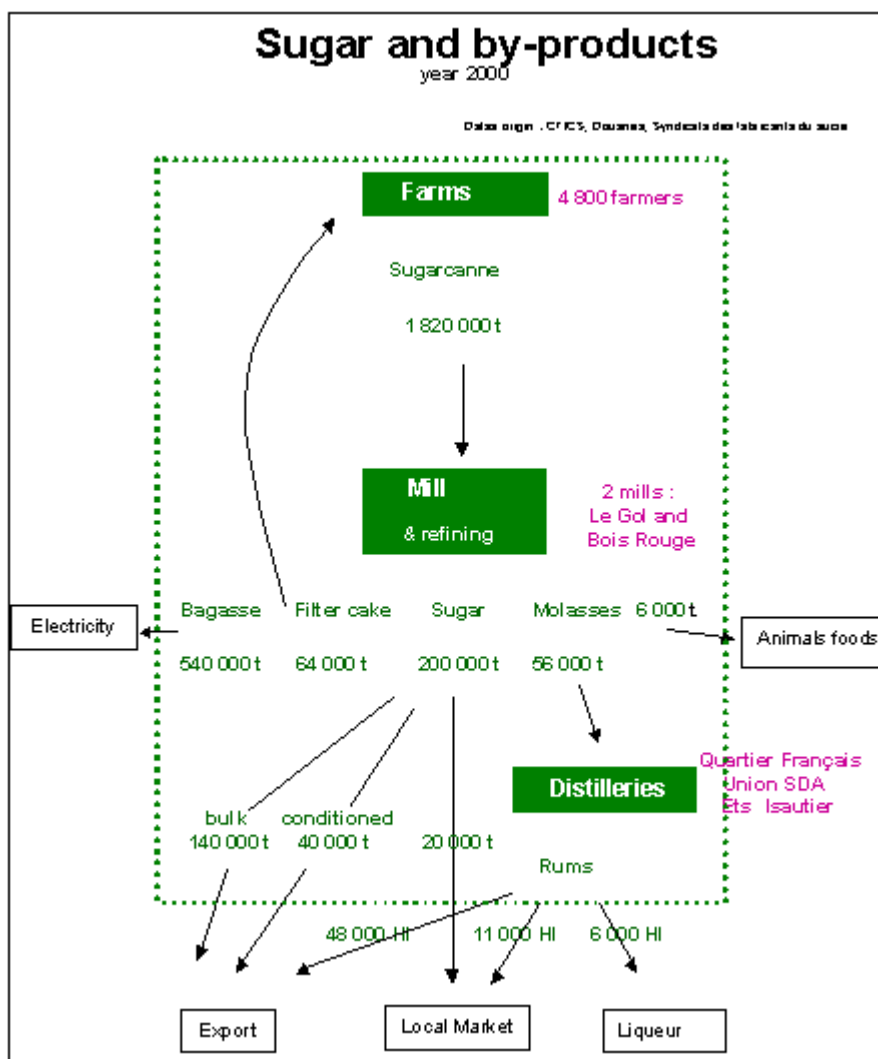
#### *Social impact*

Activities linked to sugarcane production accounts for 4% of employment (Fusiller and Pariante, 2002). The number of direct and indirect jobs resulting from sugarcane activities is estimated at 12 000. As the unemployment rate is around 30%, sugarcane has an obvious social role at island scale.

### Economic role

Sugarcane has been the island's primary crop for more than a century. At present, although Réunion's sugar production represents a very small part of the world and European production, it accounts for 90% of exports.

Sugarcane is also the basis for the development of agro-industries. Each year, 7 000 000 L of rum and alcohol is distilled, and 75% of this is exported. Factory by-products also add value to the sugar industry: 10% of the molasses is used for animal feed and the filtercake is used as fertiliser (Figure 4). Sugarcane contributes 1.6% to Réunion's gross domestic product.



**Figure 4. Structure of sugarcane industry on Réunion Island and the by-products produced.**

As part of the European Union (EU), the island benefits from a guaranteed sugar price which is higher than the global market price. Since 1968, the OCM (Common Organisation for Sugar Market) has helped to maintain market stability to ensure a regular sugar supply for European consumers and provide a stable income for farmers and millers. Thus, all the EU countries have a quota for their sugar production, determined by EU. The quota is the maximum quantity of sugar for which a price is guaranteed. Two types of quotas have been defined: quota A, for which 98% of the EU determined price is guaranteed, and quota B, for which 68% of the EU determined price is guaranteed. Quota A for Réunion is 295 000 tons of sugar. Réunion benefits also from special subsidies to compensate for the natural constraints

of the island, such as steep slopes, climatic risk due to cyclones and its distance from France. As a consequence, sugarcane provides a secure income for farmers and enables diversification (Moser, 2002).

#### *Electrical energy*

Sugarcane provides 22% of the island's electricity. By using bagasse for co-generation, the industry is not only capable of satisfying the thermal and electrical demands of the industrial process, but also of generating surplus electricity, with the consequent ecological and economic benefits. The electricity demands of the island require the use of all the bagasse produced by the sugar industry. During the milling season, both coal and all the bagasse delivered to the mills are burnt to provide 50% of the island's electricity, whereas during the rest of the year, only coal is used as raw material. Thus, although the large quantity of trash and tops sent to the mill is seen as a problem in terms of sugar extraction, they do provide the feedstock for co-generation of electricity.

#### *Environmental benefits*

On Réunion Island, sugarcane provides excellent opportunities and competitive advantages over other crops as regards the environment and the landscape quality.

It helps to limit soil erosion and water run-off, which can cause serious damage, especially during the cyclone season.

Filtercake, a by-product of the factory process, is used by farmers as fertiliser. In the 1999 season, 60 000 tons of filtercake were distributed to farmers. This not only enabled recycling of industrial waste, but also provided the equivalent of 2000 tons of chemicals in the fields. Livestock effluent can also be applied to the fields. Each year, 162 000 m<sup>3</sup> of organic effluent is produced on the island and, although legislation and transport constraints allow only a small portion of the effluent to be applied to the fields, between 30 and 40 tons of effluent per hectare could be applied. Sugarcane therefore has a high potential for the disposal of effluent.

For the past 10 years, sugarcane has been harvested as green cane. This stops the pollution problems caused by burning. More importantly, the trash improves soil fertility and reduces the consumption of herbicides (Pouzet, 2003). The effect on soil fertility can vary widely, depending on climate and soil conditions. Cane tops can also be used as animal feed.

In terms of landscape conservation, this tropical plant is marketed as a key feature of green tourism.

### **Sugar industry issues**

As sugarcane is seen as an important crop for the isle economy and environment, there is continued expansion and efforts to maintain the industry.

The difficulties in enhancing profitability are that the amount of available arable land has been decreasing because of urbanisation, and production costs and environmental pressures have been increasing.

#### *Urban pressure on arable land*

Between 1989 and 2000, the area under cane has been reduced by 22% and the number of farms has decreased by 35%. The main reasons for this are the growth in urbanisation and accompanying infrastructure (roads). According to INSEE statistics, the Réunion population will increase by 30% over the next 20 years. Most of the island is mountainous and human

activities are concentrated on one third of the surface area. Because of the scarcity of accessible land, the boundaries between agricultural and urban zones have become less and less obvious and some small fields are completely surrounded by houses. Urban pressure is thus increasing more and more.

#### *Higher costs of production*

The availability of labour is also becoming a problem. Although 85% of loading is done mechanically, 80% of the harvesting is still done manually. There are fewer cutters available (average age is increasing) and thus harvest costs are more and more expensive. Costs for cutting and transport now represent 50% of total production costs. Steep slopes, the amount of rocks and the small size of plots all limit the development of mechanical harvesters.

#### *Lower price and subsidies*

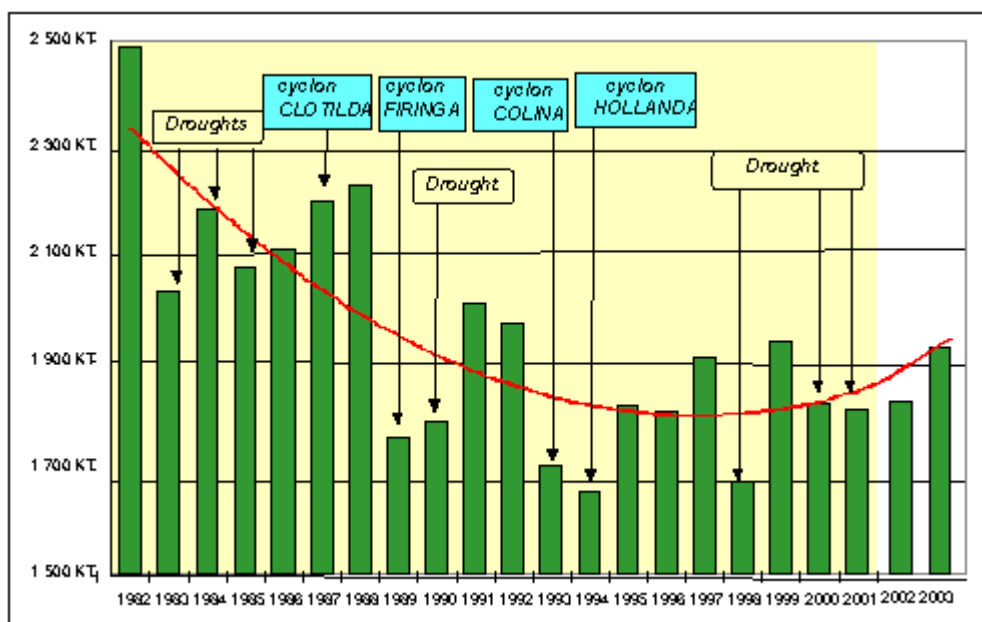
Farmer income depends a great deal on the subsidies granted and the guaranteed price he receives for his crop. The subsidies paid to farmers will be revised in 2006. If they decrease, it could be quite difficult for the sugar industry to remain profitable. Moreover, the OCM-regulated price system could be threatened. Countries promoting market liberalisation have requested that the OMC (World Trade Organisation) phase out their controlled price structure.

#### *Environmental pressure*

National environmental standards and legislation relating to the sugarcane cropping system deal mostly with conservation of water resources and pollution from fertilisers and pesticides. Although cane agriculture can be practised with a minimum consumption of chemical products, environmental legislation can be a real constraint. As an example, the use of the herbicide atrazine is now prohibited, and new products have to be tested and registered.

### **Expansion and efforts to maintain production**

Since 1989, despite the reduction in arable land, sugar production has remained stable (Figure 5). The main reasons are the improvements in cropping systems and the high involvement of all stakeholders (growers, millers, institutions).



**Figure 5. Sugarcane production on Réunion Island from 1982 to 2001.**

Over the past 15 years, average yields have increased by 25%. This has resulted from a constant effort to maintain production. Much progress has been made in terms of irrigation, mechanisation, varieties and formation.

#### *Varieties*

The introduction of variety R570 in 1979 resulted in a large increase in production. This variety is adapted to both the highlands and lowlands. New varieties are selected by a specialised body (CERF) and are tested under the various climatic conditions on the island, both in the lowlands and highlands.

#### *Mechanisation and land preparation*

Because labour is scarce and expensive, efforts in terms of land development have been made to facilitate mechanisation. At present, 85% of loading is carried out mechanically, using FARMI or Bell loaders.

Only 20% of the crop is harvested mechanically. Chopper harvesting is used on slopes of up to 20%. Modified harvesters, such as the ACF Simon (Dagallier, 2003), can be used on slopes of up to 30%. These machines are able to top and cut green cane, making piles which are dropped into the fields. They can work in small fields where shape and slope can prove difficult, cutting between 50 and 100 tons per day.

In most cases, because of the many rocks, fields are prepared by clearing stones and levelling plots. Thus, most of the agricultural land has been prepared for mechanical loading and chemical application, but only 7000 ha for mechanical harvesting.

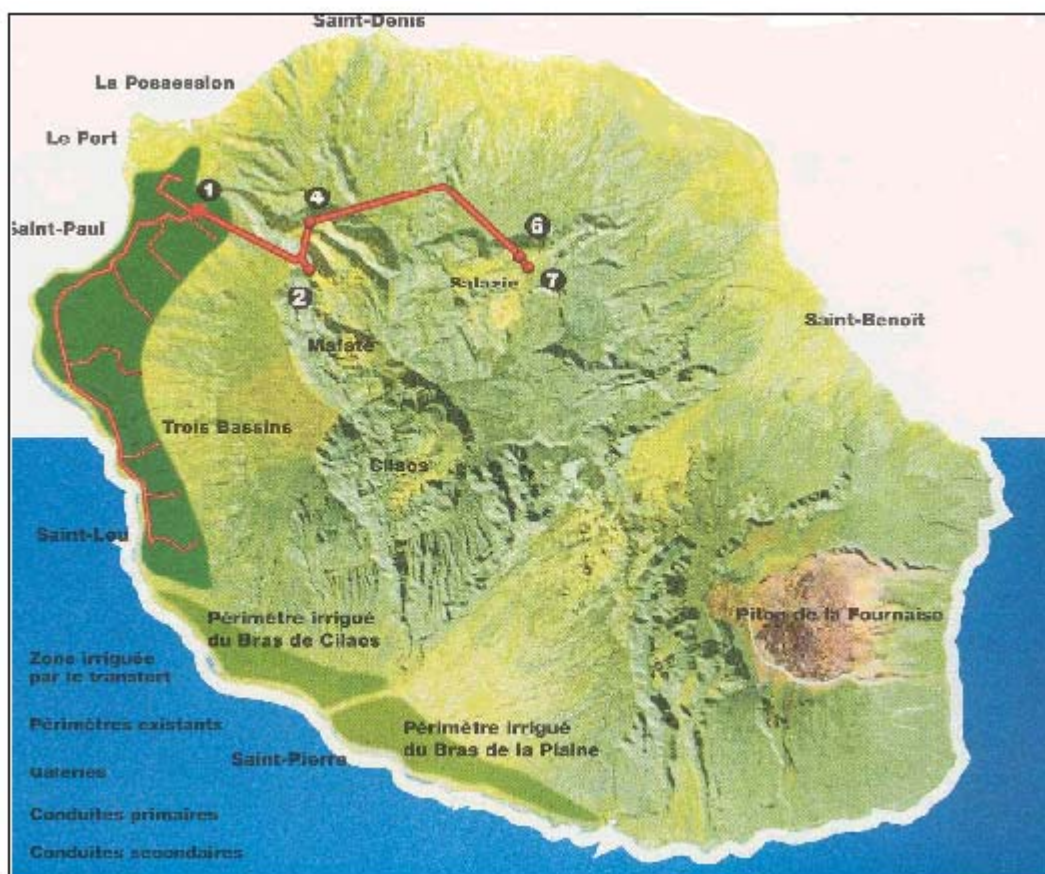
The development of mechanisation also involves grouping producers with small farms. Much work has been done to supply the groups with adapted machines, and help them organise and schedule machine operations (Siegmond and Dagallier, 2000). Although mechanisation has reduced production costs, the grouping of smallholders is proving difficult. While each grower group maintains a rateable supply to the mill, the individual growers in each group are no longer required to deliver rateably. This can force farmers to cut sugarcane over a shorter period when the quality is low. Because the cane payment system focuses on cane quality at the time of harvest (absolute payment system), farmers' earnings can be influenced by such a system of deliveries.

#### *Reclamation of abandoned land*

Currently, one of the priorities to increase agricultural land and reach the objective of 30 000 ha under sugarcane, is the reclamation of abandoned land. Since 1997, almost 1000 ha of land have been reclaimed.

#### *Irrigation*

At present, the east and the south (almost irrigated) of the island have the better cropping conditions. However, as a result of a water transfer scheme, new irrigated zones are being constructed on the western part of the island. The aim is to transfer water from the east to the west of the island (Figure 6). The project is being financed by Europe and the Regional Council, and should be completed in 2006. Among other benefits, it will enable the irrigation of 7000 ha of agricultural land (5600 ha from 0-660 m altitude and 1400 ha from 660-800 m). Irrigation will not only increase cane yields, but will also allow the reclamation of land abandoned because of droughts. The few farmers that already benefit from the water transfer have average yields of 120 to 140 t/ha.



**Figure 6. Irrigation of the west coast of Réunion Island by transfer of water from the east.**

*Other improvements and research undertaken*

Others initiatives have been started to increase the sugar industry profitability.

These are aimed at :

- increasing yields, especially in the highlands, by adapting cropping systems and cultural practices to specific climatic conditions
- reducing transport costs by improving road infrastructures and transport logistics
- reducing the delay between harvesting and crushing which is responsible for sucrose losses
- reorganising cane supply management by taking into account the variation in cane quality according to climatic parameters.

At present much research is aimed at improving farm and industrial profitability.

Three main institutions are involved:

- CIRAD, which deals with agronomy (cultural practices, fertilisation, irrigation), modelling cane growth, plant protection (pathology, entomology, weed control), genome analysis, economy and management of farms, preservation of environment, and organisation of supply management.
- CERF, which deals with variety production and sugar technology.
- University of Réunion.

Efficient and diversified extension services are charged with support to growers and producers, Extension services of the Chamber of Agriculture, and co-operative contractors.



## Conclusions

Sugarcane is a primary activity on Réunion Island. It is grown by a high majority of small-scale farmers. Varieties and crop systems are adapted to various climatic and soil conditions. It is a source of income for 5000 farmers. It limits urbanisation, it enables diversification of farms and it is a basis for the development of agro-industries. It also enhances the protection of the environment.

However, with pressures from urban expansion, environmental agencies and the high cost of production, technical, economic and organisational progress still have to be made to sustain sugar production. Much research is currently being undertaken, not only at farm scale (to increase yields under varying climatic conditions, to develop irrigation and mechanisation, and to adapt varieties), but also at mill supply area scale (for regional planning and reorganisation of supply management).

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