



INGENIO PROVIDENCIA S.A.



## Ingenio Providencia Processes

### Countryside

It includes all the manual and mechanized agricultural works required by the sugarcane crops, including the design, adaptation, preparation, planting and raising of the plantations until their harvest.

The Company has linked more than 34,000 gross hectares planted in sugarcane, and directly manages 13,800. The rest is managed by the sugarcane suppliers.

The field is adapted to make the cane production more efficient; improving irrigation and surface drainage, cultivation and this way facilitate the harvest. For this, a topographic survey is required with high precision equipment like the Total Station, GPS (Global Positioning System), RTK (Real Time Kinematic), which facilitates the design and calculation of earthworks.

In new fields for the cultivation of sugarcane, we start with clearing residues and then we level using crawler tractors or instrumented scrapers with GPS leveling systems. Afterwards, depending on the soil texture, which is verified with the maps of physical variability in the field, the soil is prepared with tire

tractor, starting with two passes of sub-soiling, one in the direction of the slope and another across the first in an angle of 15 degrees, a pass of harrow and one or two passes with the rake.



When a soca is renewed, located leveling is performed, using the productivity map as a complementary tool. The first task is grubbing that is made with two passes with a harrow, then with the sequence tasks of subsoiling, plowing and raking. Thus the land is ready for the furrowing job that prepares the soil to receive the seed; this is done with a three-way implement coupled to a tractor autonomously guided by autopilot technology.

Planting is made with the sugarcane variety best suited to the agro-ecological zone and soil series and is done in two manners:

- a) **Mechanized planting:** The seed cutting is done with a harvester and the planting is done with a equipment that fertilizes, plants and covers the seed. This task is done on autopilot.
- b) **Manual planting:** It is made with pieces of cane from the seedbeds; these have a special handling, looking pure and healthy varieties. For the establishment of the seedbeds, the seed packets are treated in a chamber of hot water at 51 degrees Celsius for one hour to prevent viral diseases. Then, stalk pieces of 60cm long are cut, each with two or three healthy buds, and these will be the new plants. From seven to eight tons of seed are placed per hectare planted. Afterwards, it is manually or mechanically covered with a soil layer of five centimeters thick and the germination irrigation is applied either by furrows or by spraying. Every 12 or 15 days, irrigation of germination is done in its early stages. Once the cultivation is settled, raising irrigation is done, approximately every 30 days.

The weed management in conventional canes is chemically performed twice, at 30 and 60 days approximately on plants and once again at 45 days approximately, in socas, and when necessary manual control is done with specialized staff for this task.

In the area cultivated by Providencia, the provisions of organic farming are followed, the weed control is done manually or mechanically or combining both systems.

On canes of organic management, the fertilization is performed by applying composted materials derived from organic origin (vinasse) and planting green manures.

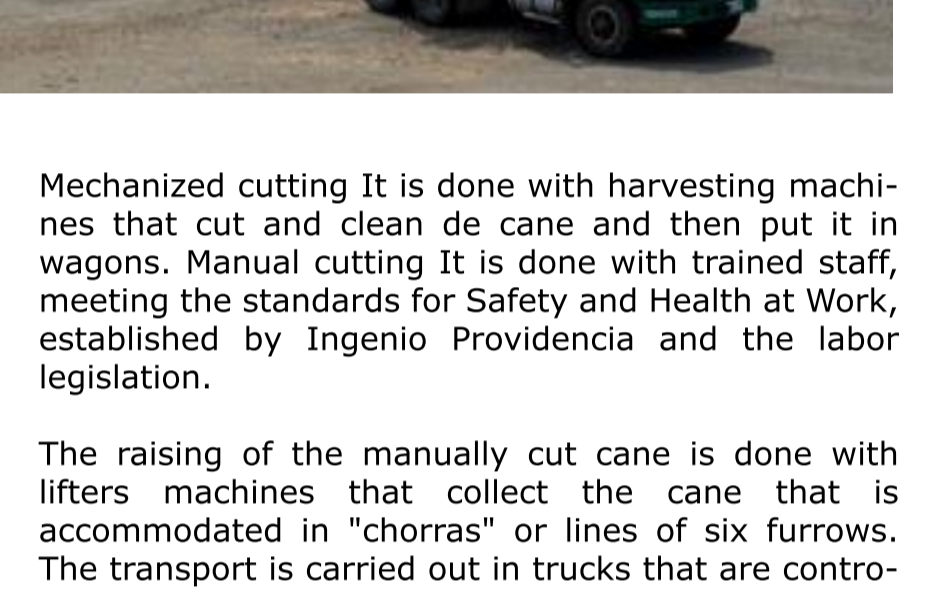
Irrigation is a fundamental task for the proper development of the crop. In the central region of Valle del Cauca, where Ingenio Providencia is located, it is determinant to apply three to five irrigations, depending on rainfall and evapotranspiration, these are done between zero and ten months in cane plants and between two and ten months for the soca canes. The frequency of application of irrigation is given by the water balance. For this purpose, we use surface water and deep wells that are driven by open channels, or tubular plastic or pipe with gates, from the source to the plot that needs to be irrigated. In order to have a better use of water, drip irrigation is being performed.

At 45 and 75 days on cane plants and at 30 and 60 days on soca plants, Providence performs fertilizers application in accordance with the recommendations of the field chemical laboratory based on soil analysis, represented in the maps of chemical variability. The basic fertilization is with nitrogen, potassium, phosphorus and minor elements according to the soil

characteristics and crop requirements. This work is done mechanically with tractors and fertilizer spreaders that allow dosing at a fixed or variable rate and add the fertilizer avoiding volatility.

The fertilization is supplemented by the application of by-products such as Provin (vinasse + nitrogen) and Provicomp (compost) as a nitrogen and potassium source, as well as a soil improver.

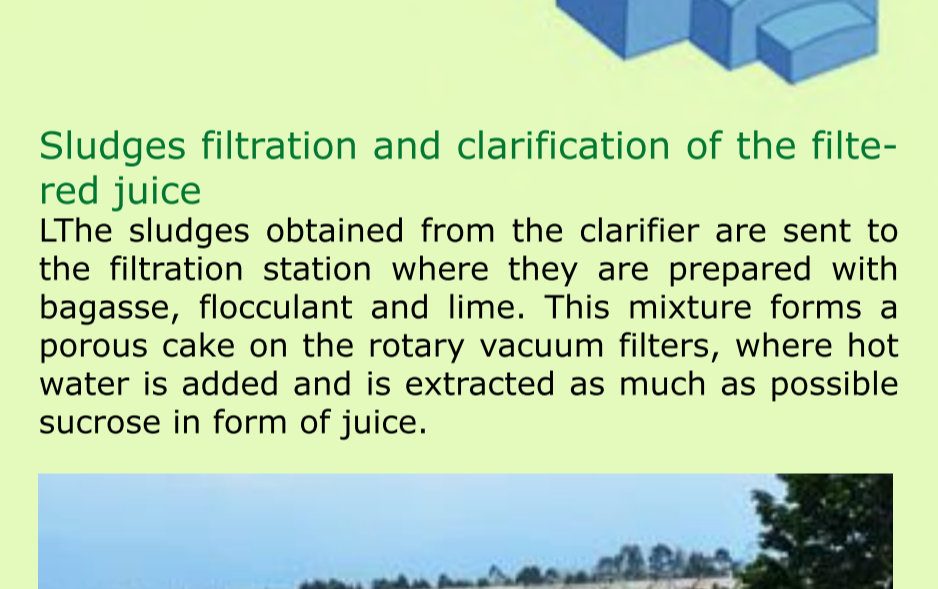
Pest control in sugarcane is made with integrated methodologies that combine the biological control with beneficial insects release, and also the cultural, mechanical and manual pest control.



The Harvest is responsible for carrying out the programming and execution of the work of cutting, raising and transportation, meeting the standards of quality, timeliness, environmental legislation and low cost.

The raising of the manually cut cane is done with lifters machines that collect the cane that is accommodated in "chorras" or lines of six furrows. The transport is carried out in trucks that are controlled by satellite.

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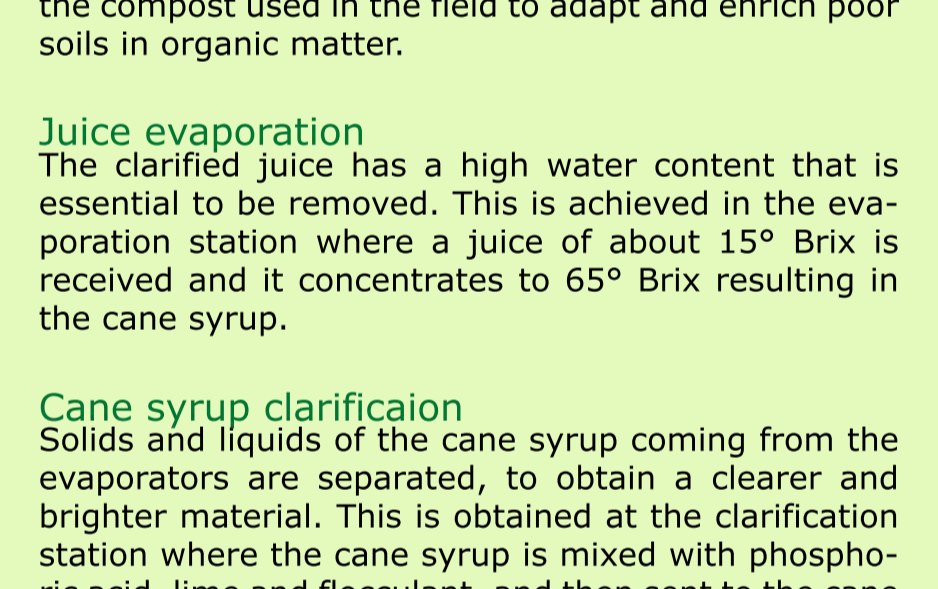
Programming of the canes to be harvested is done by selecting crops with greater maturity, based on the results of surveys carried out in the field. Once it is selected, the plot is burned complying with environmental legislation and the protocol to effect a cane burning.

This work is supported by a network of 34 weather stations that are consulted in real time to determine the speed, wind direction and appropriate time to do the burning safely. In the cane cutting process, manual and mechanized techniques are used.

Mechanized cutting It is done with harvesting machines that cut and clean de cane and then put it in wagons. Manual cutting It is done with trained staff, meeting the standards for Safety and Health at Work, established by Ingenio Providencia and the labor legislation.

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This is removed and sent to the whitewashing juice tank.

The resulting solid matter from the filtration is conducted to a hoppers, where it mixes with ash coming from the boilers. This mixture is sent to the composting plant, where it is mixed with the vinasse that is the byproduct of the manufacture of alcohol, forming the compost used in the field to adapt and enrich poor soils in organic matter.

**Juice clarification**  
The clarified juice has a high water content that is essential to be removed. This is achieved in the evaporation station where a juice of about 15° Brix is received and it concentrates to 65° Brix resulting in the cane syrup.

**Cane syrup clarification**  
Solids and liquids of the cane syrup coming from the evaporators are separated, to obtain a clearer and brighter material. This is obtained at the clarification station where the cane syrup is mixed with phosphoric acid, lime and flocculant, and then sent to the cane syrup clarifier, where air is injected into small particles that make the solids float in form of foam.

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**Crystallization**  
This process is performed in the bins, where the water of the clarified syrup cane is evaporated resulting in the crystallization of sucrose (sugar).

This crystallization can be observed in the mass that is the mixture of honey and sugar crystals.

**Centrifugation**  
The mass of the bins is sent to the centrifuges, to separate the honey from the sugar crystals. In order to obtain whiter sugar, within the centrifuge hot water is applied to remove honey residues from the crystals. Honey "A" is sent to a storage tanks, where it is subsequently used in another crystallization and centrifugation process, where honey B is obtained, this is the raw material for alcohol production.

**Drying**  
The sugar is discharged from the centrifuge "A" or first, it is sent to the dryings to remove excess moisture.

**Packaging and storage**  
The dry sugar is sent to the packaging station; it is packaged in the different presentation types for the national and international markets.

Providencia products meet all quality standards required by the customers. In its portfolio, there are:

- > White and Brown Sugar
- > Providencia Organic Sugar
- > Alcohols
- > Organic fertilizer
- > Electric power

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