RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

cirad
AGRICULTURAL RESEARCH FOR DEVELOPMENT

Sugarcan

Sugarcane is grown in more than a hundrec ent farmers and agroindustrial firms. While the sugar and rum markets have always been tl crop, it is increasingly the object of interest from pharmaceutical, chemical and energy firms. tisfy growing, ever more diverse demand. CIRAD and its partners are therefore helping sugarcane value chains evolve and diversify.

Sugarcane is a giant tropical grass from the family Gramina store processing of the stalks to make rum. However, the impres d int contains a wealth of molecules for the chemicals industry.

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences Refuse Accept

Sugarcane, a giant grass full of sugar

Sugarcane originated in Papua New Guinea. It belongs to the Graminaceae family and to the botanical genus Sac officinarum, known as "noble cane", S. sinense, and S. barberi —and three non-sugar-bearing species—S. robust n creating hybrids between noble cane and the other species. The modern varieties are all derived from those crosses.

Canne à sucre © Cirad

The plants bear many long, narrow leaves. Through photosynthesis, this large leaf area serves to produce plant matter, of which the main molecule is sugar. The leaves are also good fodder for livestock.

The root system is both dense and deep. This is why sugarcane protects soils efficiently, notably against erosion due to heavy rains and cyclones.

The inflorescence, or spike, is a panicle comprising a multitude of flowers that produce tiny seeds, known as "fuzz".

Like maize and sorghum, sugarcane is a "C4" plant. Their specific functioning enables them to absorb much more carbon dioxide (CO_2) and sunlight than other plants. In exchange, they also give off more oxygen and produce substantial amounts of biomass. In sugarcane, this hyperactivity results in luxuriant vegetation and high s

Canne à sucre © Cirad

From Papua New Guinea to the Mediterranean

Sugarcane originated on the island of Papua New Guine people within the Pacific Ocean region, reaching Oceania, Southeast Asia, southern China and the Indus a that the history of sugar began... It is though that the Indians already knew how to extract cane sugar anc 5000 years ago. Caravan traders travelled throughout the East and Asia Minor selling sugar in the shape of crystallized loaves; sugar was a sp

In the 6th century BC, the Persians invaded India and to xtraction practices. They grew sugarcane in Mesopotamia and kept the secrets of extraction to themselves for more than 1000 years. The after a battle against the Persians near Baghdad in 637 AD. They successfully developed sugarcane growing around the Mediterranean, as far as Andalusia, thanks to their mastery of farming techniques, notably irrigation. While the Arabo-Andalusian peoples became experts in sugar, for other European re usades, from the twelfth century onwards, that those regions really took an interest in it.

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]

pdf - 1569.7Ko

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

In the sugarcane fields

Sugarcane needs sunshine, water and heat. In areas without enough water, the fields are irrigated, like in Austra

It is a perennial crop, which grows back after each harvest. After five or six "regrowths", the old plants are pulled ng cuttings from the stem and burying them horizontally.

Champs de canne à sucre © Cirad

n the sugarcane fields

highly coveted plant

rom cane to sugar

Making rum

Bagasse, molasses, ethanol...

insects! As a result, mechanical methods are increasingly being used. A worker can cut between 3 and 5 tonnes of stems a day, while a mechanical harvester can cut up to 60 tonnes of stems an hour!

In very hot climates, for instance in [illegible] donesia, the crop can be harvested 9 to 12 months after planting or regrowth, while in other, cooler regions, such as the highlands of Hawaii, or South Africa, it takes 18 to 24 months.

Once cut, the stems have to be transferred to the mill within two days, as their sugar content falls rapidly. Harvesting is therefore a crucial stage. It requires considerable organization in order to supply the factories that produce sugar, rum, ethanol fuel and other products.

In some regions, for instance in Réunion, sugarcane growir [illegible] ınd contributes to the quality of the landscape and its attractiveness to touris [illegible] nmental advantages: it is effective against erosion; it fosters energy [illegible] or some organs or sugar mill waste can be used to produce electricity and bio [illegible] ed by recycling all sorts of organic matter.

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]

pdf - 1569.7Ko

A highly coveted plant

Sugarcane grows so exuberantly that numerous insects love it: stem borer caterpillars; leaf miner caterpillars; wl [illegible] ll plants, sugarcane is subject to diseases, caused by bacteria, fungi or viruses.

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

cirad
AGRICULTURAL RESEARCH FOR DEVELOPMENT

Feuille de canne à sucre © Cirad

n the sugarcane fields

Fiji disease, caused by a virus transmitted by a small sucking insect (Perkinsiella saccharicida) had producing countries running scared until the 1960s. It causes elongated warts on the underside of the leaves; the leaves harden and dry out and the plant stops growing and eventually dies. The creation of quarantine facilities at cane to sugar es significantly reduced the spread of the disease.

highly coveted plant

rom cane to sugar

Making rum

In Réunion, to control a chafer, the soils are treated with granules containing spores of Beauveria brongniartii, a parasite of the grubs. The chafers are caught and dipped in a spore solution; when they fly off, they spread the spores within the sugarcane plantings and ow insects by

Bagasse, molasses, ethanol...

richogramma, is ggs in a moth rough sugarcane eral tens of ammas per hectare sugarcane fields.

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

From cane to sugar

Extracting sucrose, the sugar found in the stems, consists in isolating it from the rest of the plant. On entering th analysed. The stems are then crushed into rough fibre, using a hammer grinder.

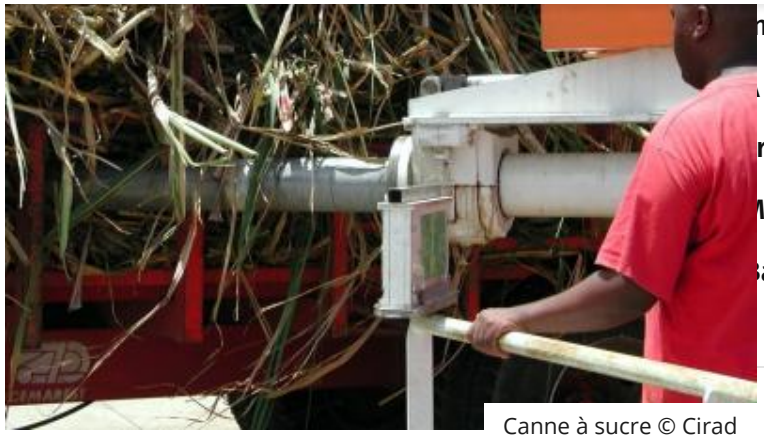
To extract the juice, the fibres are simultaneously watered with hot water and pressed in a roller mill. The fibrous used to fuel boilers to generate electricity.

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

cirad
AGRICULTURAL RESEARCH FOR DEVELOPMENT



Canne à sucre © Cirad

n the sugarcane fields

highly coveted plant

rom cane to sugar

Making rum

Bagasse, molasses, ethanol...

impurities, or scum, which can be used as a fertilizer. The syrup is heated in a pan, until it turns into "massecuite", containing a syrupy liquid, the liquor, and sugar crystals. That massecuite is then heated another twice, alternated with stirring and centrifugation operations, so as to obtain as great a volume of sucrose crystals as possible. The crystals are then sent for drying. The first sugars obtained are various grades of brown sugar. White sugar is produced by refining brown sugar, which is re-melted, decolourized and filtered, before being crystallized and dried. The

Récolte canne à sucre © Cirad

d in watertight bins. White sugar is the favourite type for both consumers and industrialists.

What is left after crystallization is molasses, a sugary liquid tances, which can be sent to a distillery to make rum.

Making rum

For thousands of years, sugarcane growing has been assoc m as we know it started out in the Caribbean and Brazil in the 17th century. Traditional rums are made by fermenting molasses, which produces "i... ...g cane juice, which gives "agricultural rum". The sugary wort is produced by diluting molasses or filtering cane juice.

Fermentation yeasts are multiplied in a mother tank and th / conv
that rum aromas are formed. This produces a cane wine w en 12
rums. In Guadeloupe, one tonne of sugarcane stems produ .

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

Once fermentation is completed, the cane wine is transferred to stills, where it is heated to separate the alcohol cooled and collected in condensers. The distiller's art consists in keeping the most volatile aroma molecules, alsc

The distillation residue, known as vinasse, is a pollutant. It can be recycled as a fertilizer or as an energy source. T
110 litres of vinasse.

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

62°.

Bagasse, molasses, ethanol...

Transformation canne à sucre
© Cirad

Bagasse, which is primarily made up of cellulose, hemicellulose and lignin, is a source of energy (it can be burnt), and of fodder for livestock. It is also a raw material for making paper, cardboard, thermal insulation, films and textiles. Molasses is used to feed animals, grow yeasts are produce acids.

The sucrose undergoes a range of chemical processes to make ethers and esters, which in turn serve to make plasticizers, adhesives, cosmetics, varnishes, etc.

The ethanol obtained lasses can be used pure as a biofuel. In Brazil, more than half of the sugarcane crop is used to make fuel eth nol. Cane varieties have been specially bred for ethanol production. The ideal solution for larger-scale produ plant: research is under way to produce ethanol directly from cellulose.

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

- In the sugarcane fields
- A highly coveted plant
- From cane to sugar
- Making rum
- Bagasse, molasses, ethanol...

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

The origin of sugarcane revealed

RESULTS & IMPACT
27 March 2024

Success tastes sweet | Sugarcane's complex genetic code has been cracked

INSTITUTIONAL NEWS
2 February 2024

CIRAD

- In the sugarcane fields
- A highly coveted plant
- From cane to sugar
- Making rum
- Bagasse, molasses, ethanol...

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

for sustainable sugarcane growing

- In the sugarcane fields
- A highly coveted plant
- From cane to sugar
- Making rum
- Bagasse, molasses, ethanol...

Related projects

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

cirad
AGRICULTURAL RESEARCH FOR DEVELOPMENT

agricultural activities in tropical environmen

Biodiversity and Plant Health - Epidemiolog surveillance, molecular epidemiolog and environmen adaptation

Facilitating the agroecologic transition in three overseas départemen

- In the sugarcane fields
- A highly coveted plant
- From cane to sugar
- Making rum
- Bagasse, molasses, ethanol...

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

cirad
AGRICULTURAL RESEARCH FOR DEVELOPMENT

and Réunion

- **In the sugarcane fields**
- **A highly coveted plant**
- **From cane to sugar**
- **Making rum**
- **Bagasse, molasses, ethanol...**

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

See also

Banana and plantain

Innovating hand in hand with players in the

Cocoa

Improving the livelihoods of rural households

Coffee

Returning to ecologically viable systems and

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

cirad
AGRICULTURAL RESEARCH FOR DEVELOPMENT

Cirad

The French agricultural research and international cooperation organization working for the sustainable development of tropical and Mediterranean regions.

DIRECT ACCESS

CIRAD intranet
Job vacancies
Contacts and access
eduroam network
Podcast
Document library
Open data portal
Photo library
Éditions Quae
Newsletters
Frequently asked questions - FAQs

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences

- In the sugarcane fields
- A highly coveted plant
- From cane to sugar
- Making rum
- Bagasse, molasses, ethanol...

Sugarcane roadmap summary. The road to sustainable sugarcane growing [2023-2033]
pdf - 1569.7Ko

© CIRAD 2025 Legal details - Personal Data ment - Cookies

The cirad.fr site uses cookies intended to measure the site's audience, improve your browsing, and access certain functionalities. By clicking on 'Accept', you authorize CIRAD to use these cookies. You can also 'Refuse', or find out more by clicking on 'Change your cookie preferences'

Change your cookie preferences