



# Ingenio Risaralda

## Sustainability and efficiency

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ISO Zoom series focusing on colombian  
sugar industry. April and May 2021



# Topics

**01**

**Context and location  
Ingenio Risaralda**

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**02**

**Colombian sugar  
industry context**

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**03**

**Success cases**

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In the field, in  
harvest and in the  
factory

**04**

**Sustainable development**

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- Social commitment
- Environmental  
commitment



**01**

**Context and  
location  
Ingenio Risaralda**



**Ingenio Risaralda**  
is located in the heart of  
Colombia

In the middle of impressive mountains, we  
are the most northern of the 13 sugar mills



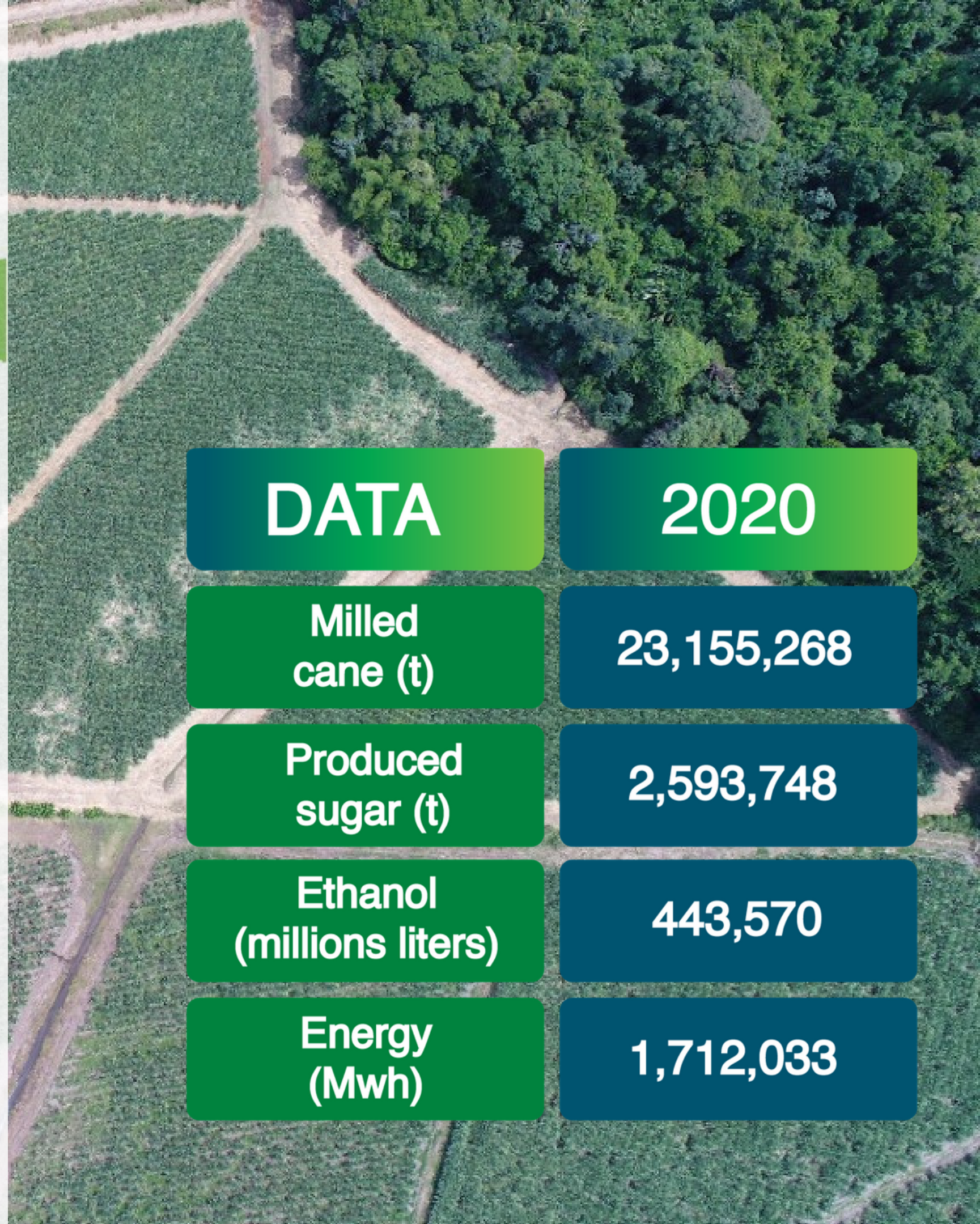
Image Landsat / Copernicus  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image IBCAO

Google Earth



# 02

## Colombian sugar industry context



DATA	2020
Milled cane (t)	23,155,268
Produced sugar (t)	2,593,748
Ethanol (millions liters)	443,570
Energy (Mwh)	1,712,033



Ingenio  
**Risaralda**

Lo hacemos posible



# Sugar

3,722,052 quintals

1,576,466 tons  
of milled cane

We export to  
**28 countries**

# Alcohol

25,396,447  
liters of alcohol  
produced

# Energy

199,948 Mwh  
Electric power  
generation capacity

121,578 Mwh  
Electric power sold  
in the year

# Composting

18,915 tons  
of compost

5,042 tons  
more than in 2019



2020



42 years of  
experience

WE CREATE  
JOBS



2,865  
workers



# 03 Success cases

In the field, in harvest  
and in the factory





## In the field:

### Weed refuges for biological pest control

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Since 1970 the 240,000 hectares planted in the region are managed with biological control

- *Diatraea spp.* is the most limiting insect of sugarcane in America
- It causes losses in biomass formation
- It impacts sugar yield



## In the field: Weed refuges for biological pest control

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- In Colombia, *Diatraea spp.* is controlled by parasitoid insects

*Trichogramma exiguum*  
wasp



Attacks  
eggs

## Attacks larvae



Native fly  
*Genea jaynesi*



Native fly  
*Lydella minense*  
\*It cannot be mass-  
raised in the laboratory



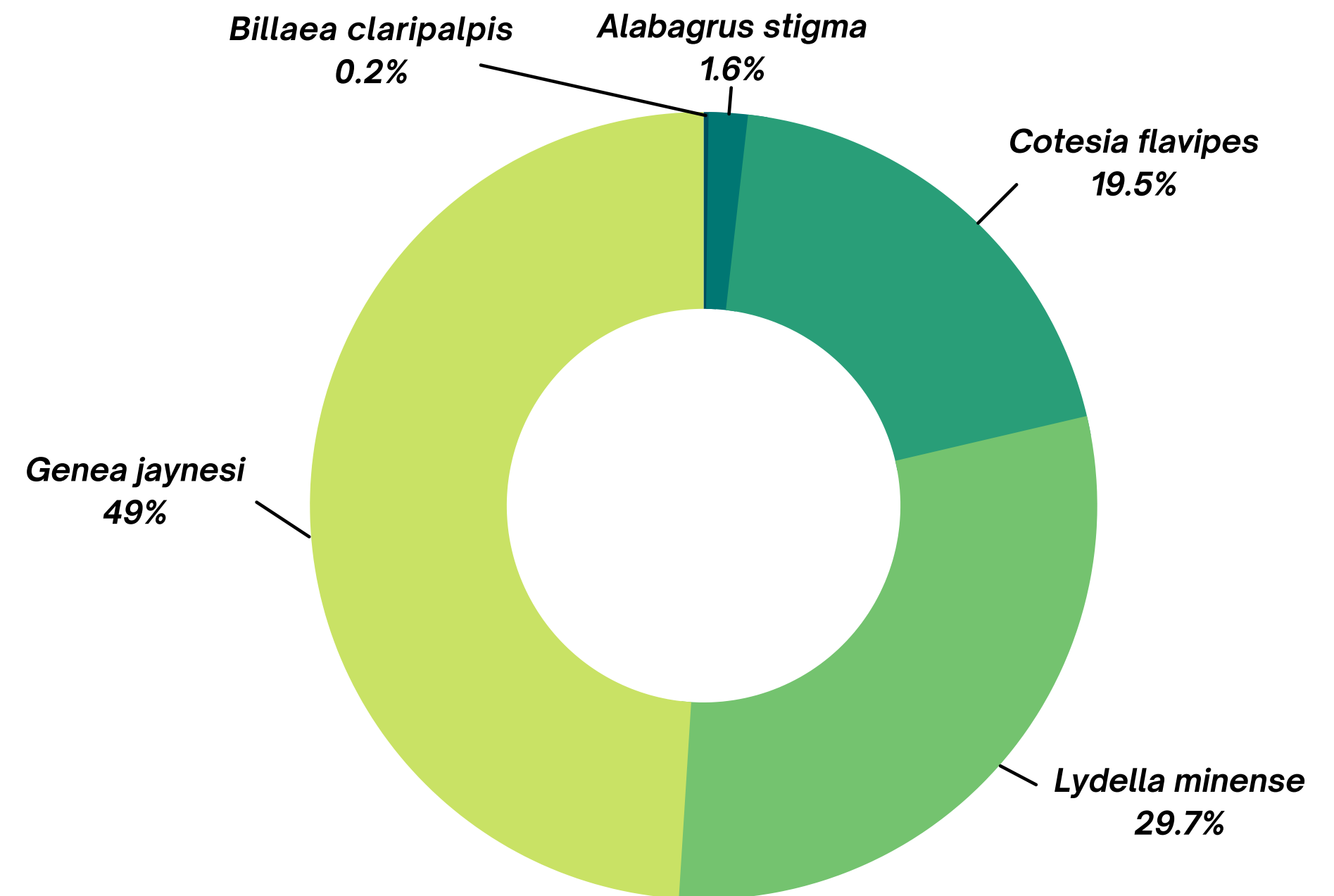
Wasp  
*Cotesia flavipes*

## In the field: Weed refuges for biological pest control

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*Genea jaynesi* is the  
main parasitoid of larvae  
of *Diatraea spp.*

## Parasitism in larvae of *Diatraea spp.* Agroindustrial sugarcane zone Cauca river valley 2015 - 2019



\*Source: Cenicafña

# In the field:

## Weed refuges for biological pest control

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### Solution:

Biological control by conservation

### Hypothesis:

Conservation of weed (nectariferous plants) around sugarcane cultivation promotes the population of *Genea jaynesi* to control the *Diatraea spp.* pest.



Nectariferous plants



## **In the field:**

### **Weed refuges for biological pest control**

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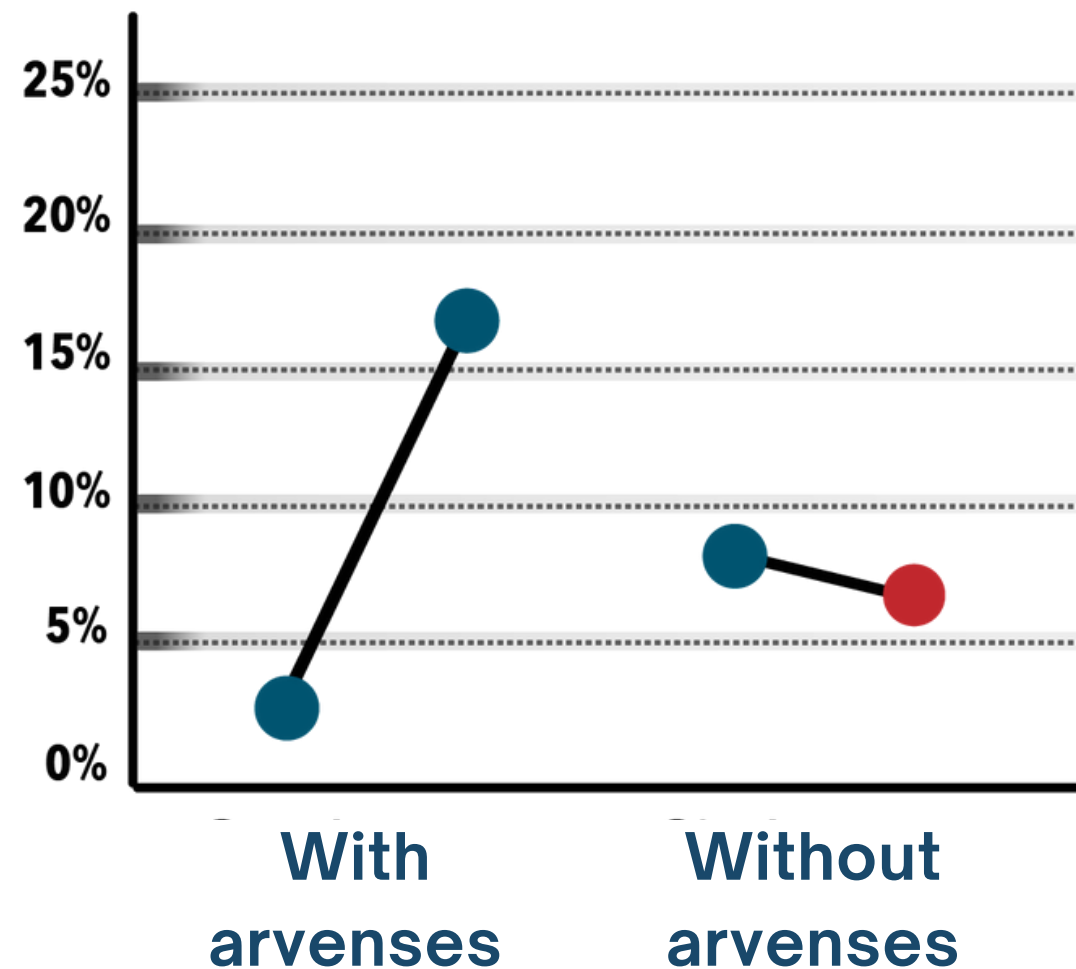
We compared crops with and without surrounding weed refuges

We collected larvae in two ages of the crop (2 and 4 months)

Presence of weed increased the percentage of larvae parasitized by *Genea jaynesi* in the second collection.

In the absence of weed refuges, the change in the percentage of parasitized larvae was small

**% Parasitized larvae**



**In the field:**  
Weed refuges  
for biological pest  
control

*Results*

## In the field: Weed refuges for biological pest control

We evaluated the damage to drilled internodes of 100 cane stalks due to the presence of *Diatraea spp* was evaluated at the end of the crop cycle, comparing 2016 and 2018

We compared crops with and without surrounding weed refuges

### Differences of damages caused by *Diatraea spp.* by allotments

	Damages by <i>Diatraea spp.</i> 2016	Damages by <i>Diatraea spp.</i> 2018	Difference 2018 - 2016
Cane crops with weed	8.4 %	5.8 %	2.6 %
Cane crops without weed	6.7 %	9.5 %	-2.8 %



**In the field:**  
Weed refuges  
for biological pest  
control

## Results

### Estimated losses due to damage by *Diatraea spp.*

Damage by <i>Diatraea spp.</i>	Loss in sugar production kg / hectare	Economic loss USD / hectare (kg of sugar: USD 0.4)	Economic loss Ingenio Risaralda USD / 16.059 hectare (kg of sugar: USD 0.4)
<b>2.8%</b>	2.8 ton of cane (280 kg of sugar)	<b>\$ 112</b>	<b>\$ 1,798,698</b>

#### ▶ Reference values:

For every 1% damage by *Diatraea spp.*, one ton of cane is lost (per hectare), equivalent to 100 kg of sugar





## **Biological control strategy for conservation = biological corridors**

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- Stimulates the establishment of habitats.
- Increases the diversity of the agricultural landscape.

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- Promotes the biological control of agricultural pests.
  - Makes the habitat more resilient against foreign pests or outbreaks stimulated by climate change.

# In harvest

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Increased efficiency of cane harvesters through telemetry tracking

Ingenio Risaralda  
Harvest mechanization

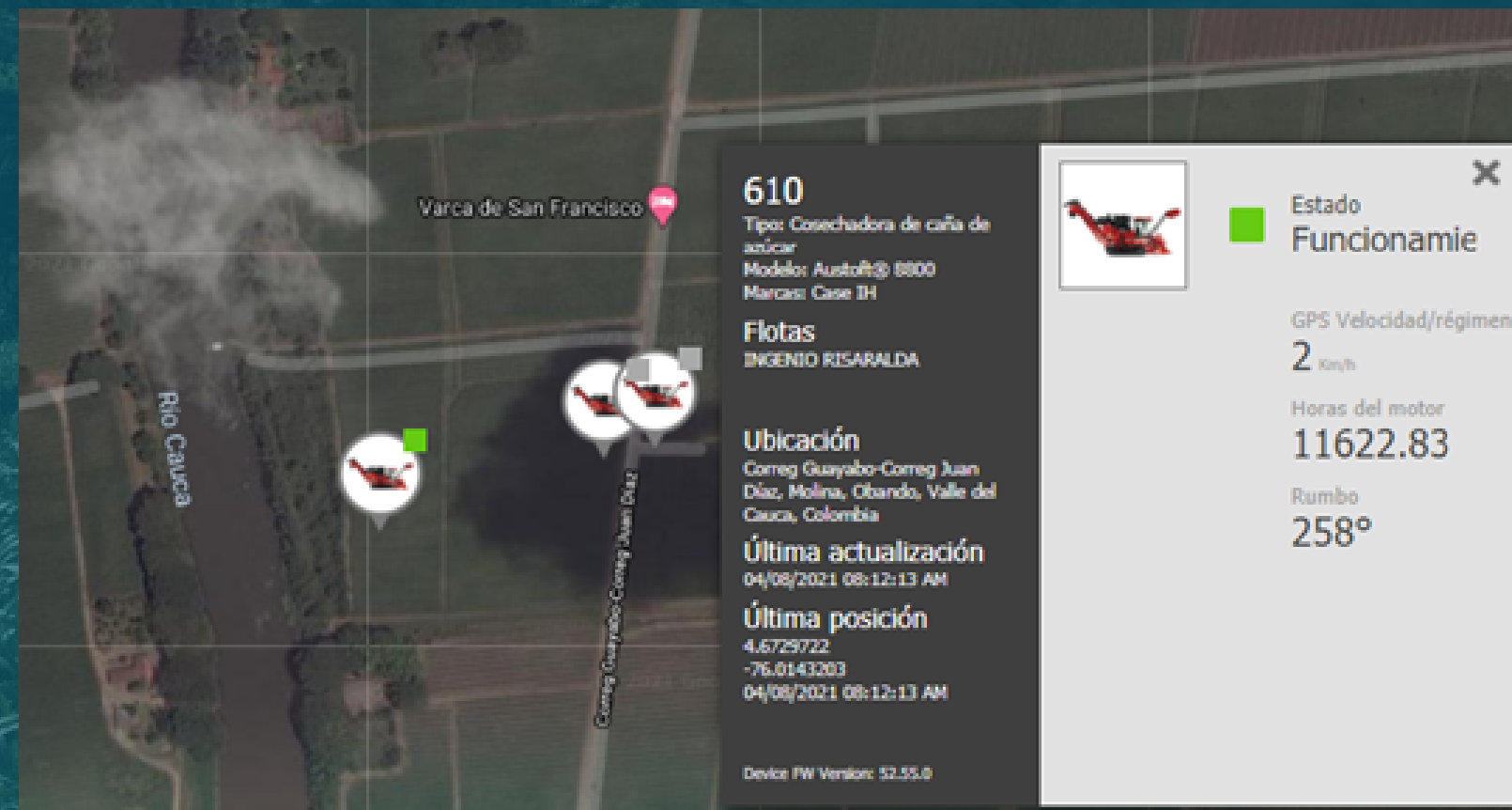
 2021: 63%

Telemetry allows carrying out online tracking of the status of each of our cane harvesters

# Comprehensive management and control of sugarcane harvesters

Entering the CAN network of each machine allows:

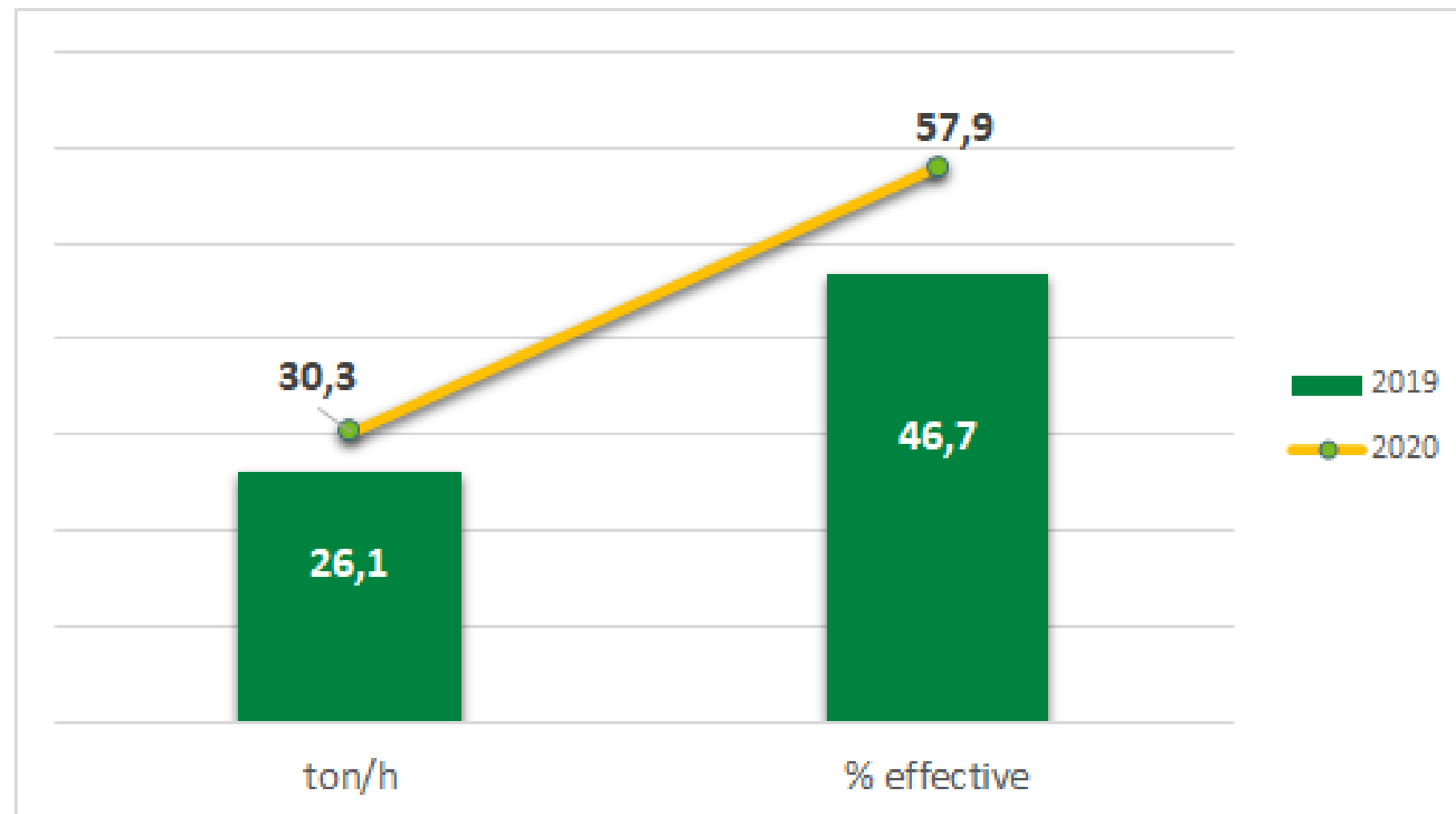
- Monitoring of 27 operating and mechanical indicators
- Machine status
- Alarms control
- Geographic location



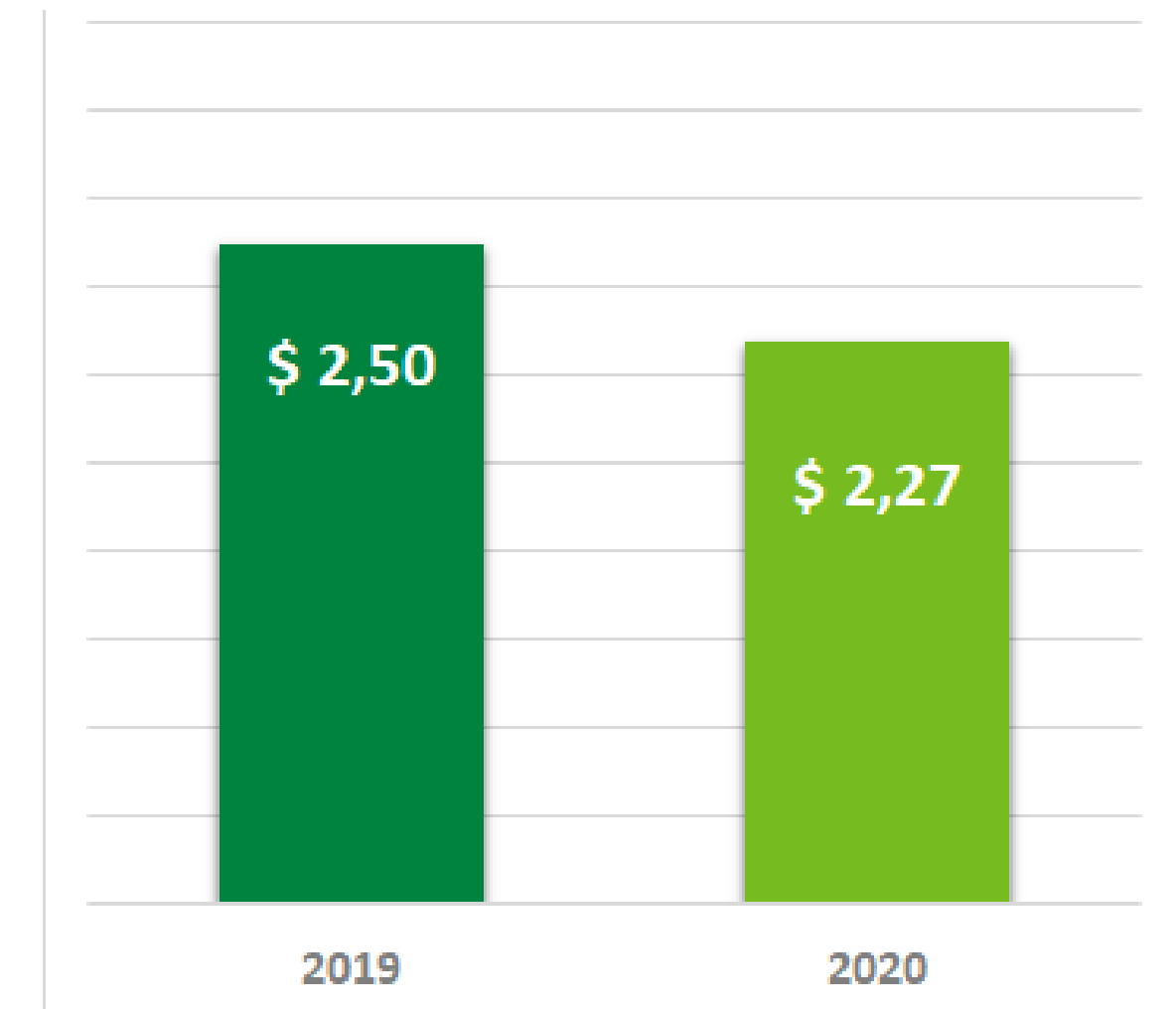
# In harvest

Increased efficiency of cane harvesters through telemetry tracking

## Increased efficiency by telemetry



## Costs USD/ton





# In harvest

Increased efficiency of  
cane harvesters through  
telemetry tracking

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## Results



# Telemetry

More effective  
hours:  
4 tons  
x machine

More tons/day:  
**330** tons  
Day

Savings:  
**USD 196,200**  
in 2020

# In the factory

Project: Steam economy in sugar production process

## Income

USD 1,034,898

increase of quintals by reduction of losses of sucrose

## Income

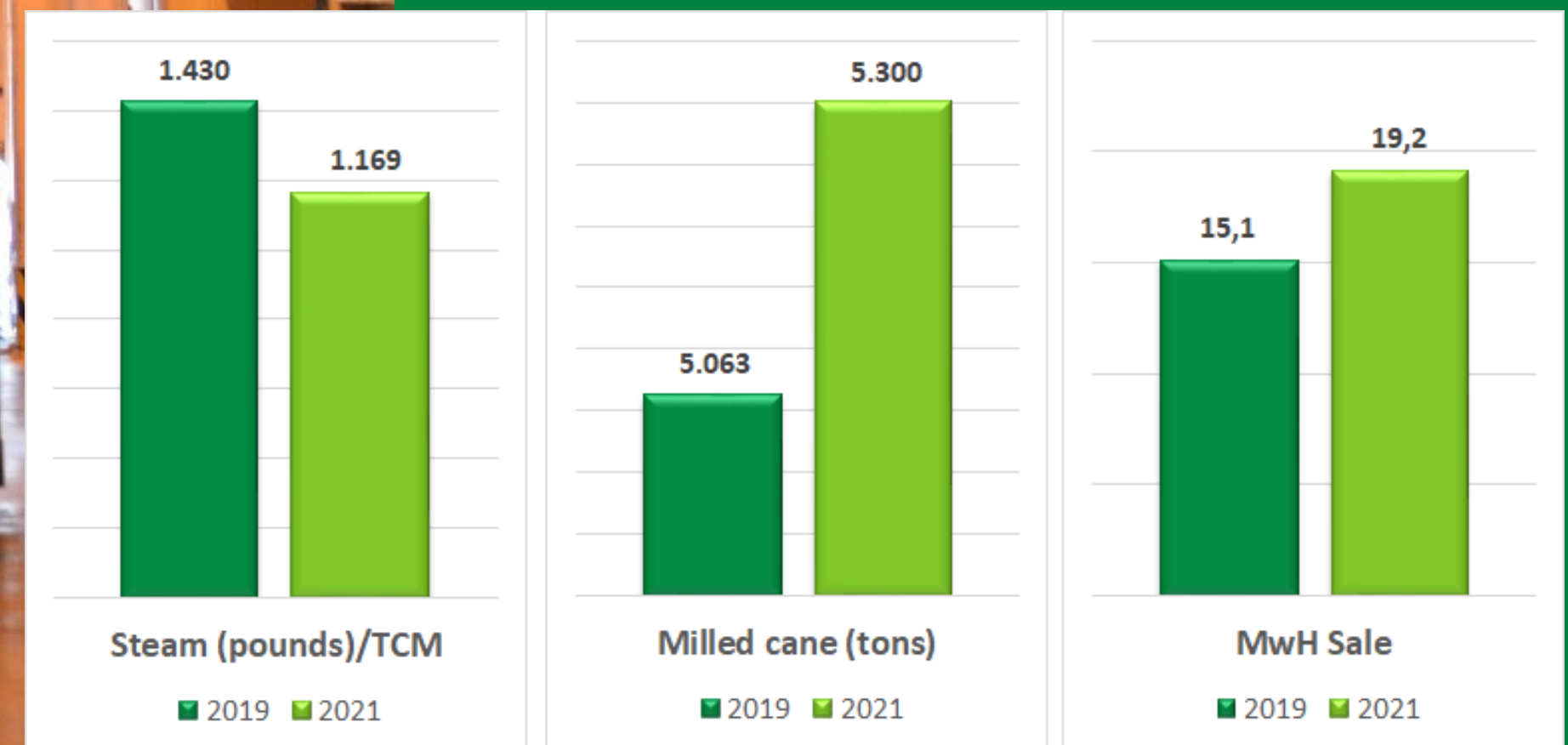
USD 1,224,008

increase in the sale of energy

## Multi-reboiler evaporator project



We produced higher income from the sale of **energy**





# **Sustainable development**

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Our social and  
environmental  
commitment

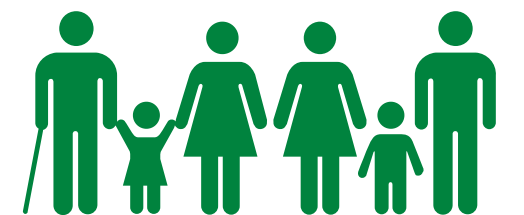


# Social Commitment

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Our foundation **Fundeagro**  
+ **sugar cane suppliers**

Together we lead social programs  
to improve the quality of life of  
children and adults in our  
influence area





**480,000**  
liters of  
Alcohol



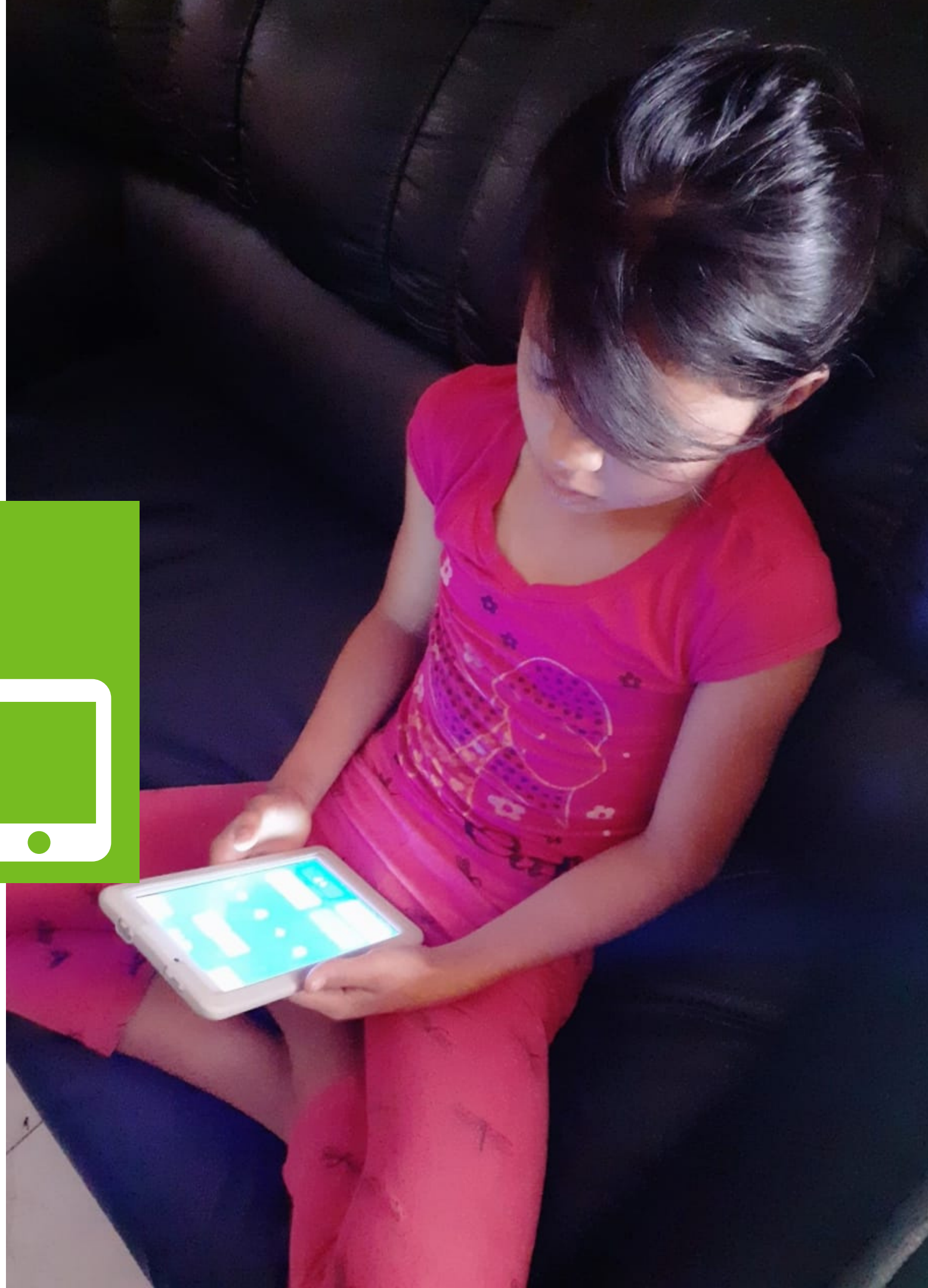
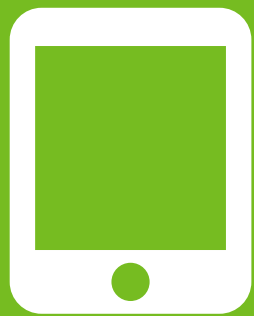
# Social Commitment

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During 2020 we  
donated more than  
480,000 liters of  
alcohol to address  
the pandemic



**150**  
Tablets



# Social Commitment

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We delivered 150 tablets in our area of influence with specialized educational apps for different grades, without requiring internet connection in these rural areas



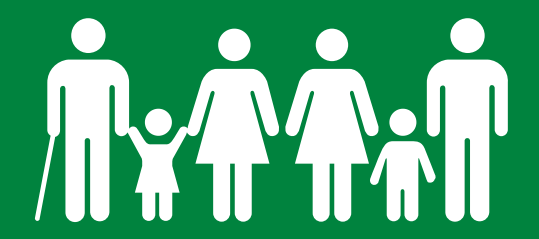


# Social Commitment

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During 2020 we donated more than **4,000** family food packs

**4,000**  
Food packs



# Social commitment

**54** Children  
with sports  
training  
scholarships

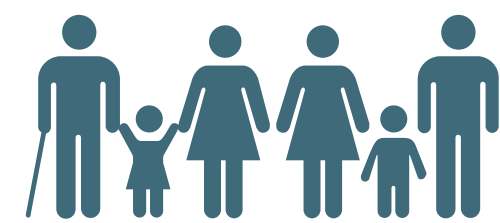


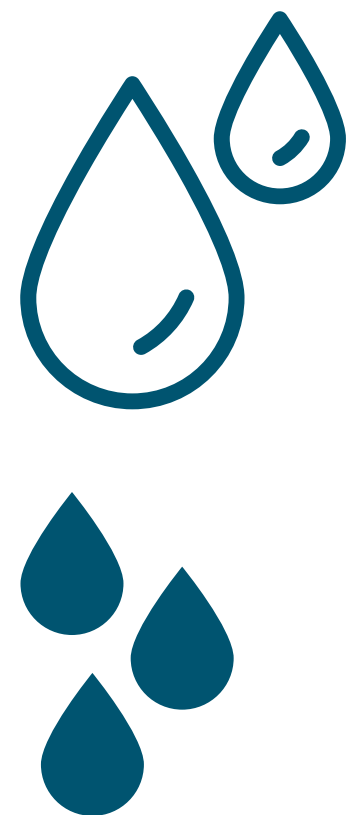
**190** Children  
benefited from  
Sweet Schools  
Program



More than **2,000**  
people  
benefiting from  
social, cultural,  
environmental  
and health  
programs



A white icon of a family consisting of two adults and two children, one of whom is using a cane.  
**2020**



# Environmental sustainability

## Comprehensive Water Management Plan

**Our goal:** To reduce the demand of water and improve the quality of the final effluent

Investment in million  
USD 5.78 | 2020-2021

### Goals of reduction

Biological oxygen demand (ppm)

81%

Chemical oxygen demand (ppm)

80%

Total suspended solids (ppm)

59%

Effluent (m<sup>3</sup>)

50%

Water demand (m<sup>3</sup>)

77%





# Environmental sustainability: Emissions

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## Energy cogeneration project

- We decreased emissions of particulate matter (PM) from the boiler by 95%.
- We produced renewable energy (from sugarcane bagasse).
- We reduce internal energy consumption by 13%.



# Environmental sustainability

Energy cogeneration project

Investment in the project

Millions of USD

**\$ 64.47**

Investment in maintenance

Millions of USD

**\$ 2.27**

2018 -2021



# Environmental sustainability: Byproducts



## Circular economy

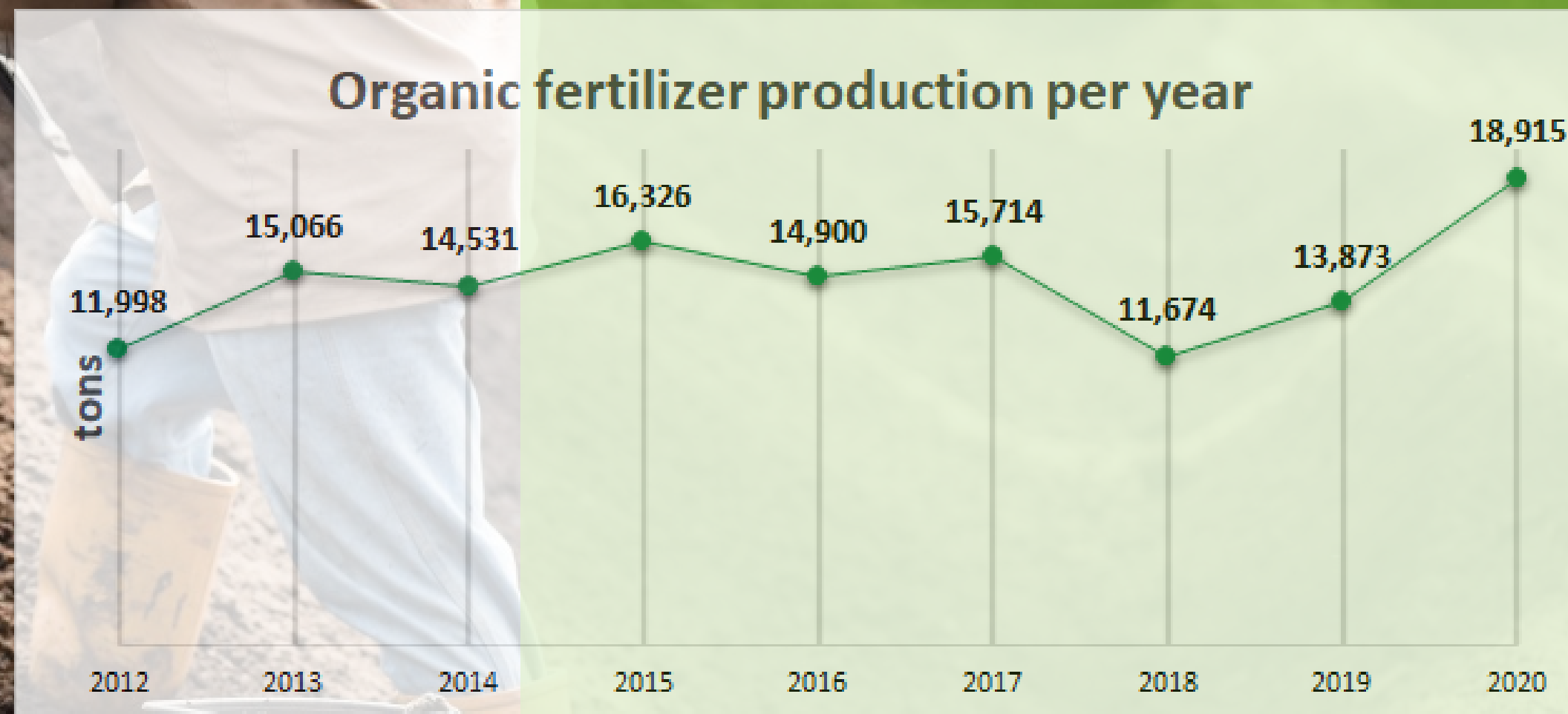
Organic fertilizer from organic waste (*cachaça* and *vinasse*) from the production of sugar and ethanol



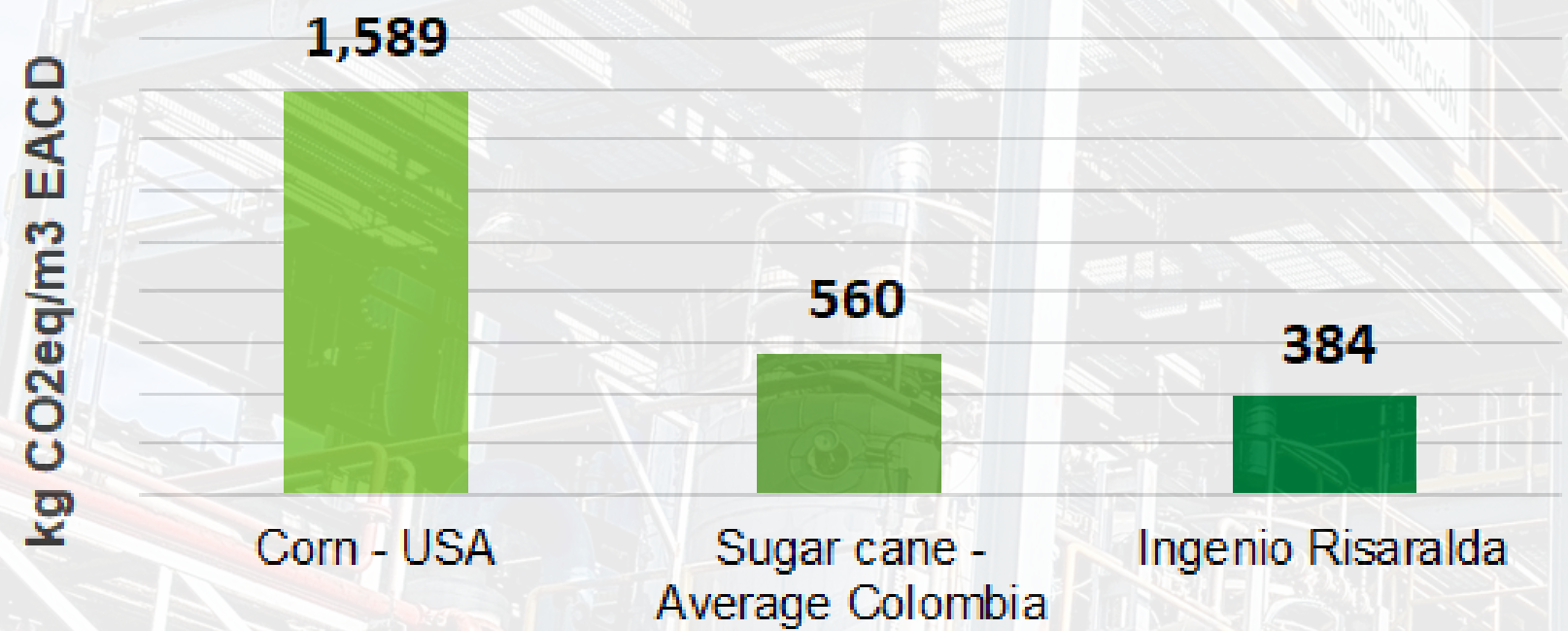
# Environmental sustainability: Byproducts

Organic fertilizer  
production

Investment  
USD 3 million  
2016 - 2020



## Emissions in ethanol production Anhydrous denatured fuel



Source: Cenicaña



Lower carbon footprint from ethanol production than that produced in the USA from corn.

Lower carbon footprint from ethanol production compared to the average production from the sugar sector in Colombia

# Environmental sustainability

We bet on cane ethanol



**We make it possible**

Luis Felipe Gaviria Giraldo  
[fgaviria@ingeniorisaralda.com](mailto:fgaviria@ingeniorisaralda.com)

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