

# Mechanized harvesting has not reduced atmospheric pollution in the sugarcane region

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The burning of sugarcane, carried out to eliminate dry leaves before harvesting, for years altered the air quality in the central region of the State of São Paulo, Brazil. The particles launched into the atmosphere during the process were visible to the region's inhabitants and were deposited in the streets and on cars.

Atmospheric pollution also caused respiratory problems among the population, impacts on biodiversity and the native vegetation, and contaminated rivers.

Technological advances and pressure from society led to the end of this practice, made official via a [state law](#) in 2002. Little by little, [sugarcane](#) burning was substituted by more modern techniques, such as the use of mechanical harvesters that remove and separate the sugarcane parts without the need to burn the area that will be planted.

"In 2018, mechanized harvesting was used in 90% of the production. It was hoped, above all, that there would be an improvement in air quality with the end of burning.

However, aerosol and ozone particle concentrations remain at the same levels as before. This leads us to believe that, despite the [technological advances](#) in agricultural technologies, there are other sources of greenhouse gas emissions and particulate matter," said Arnaldo Alves

Cardoso, a researcher at the Institute of Chemistry of the São Paulo State University (UNESP) in Araraquara, in a lecture given at FAPESP Week France.

## **Sugarcane macronutrient residues**

Brazil is the biggest sugarcane producer in the world. The main producing region is located in the State of São Paulo, which has the highest population density in Brazil and an economy based primarily on agroindustry.

"The State of São Paulo covers 55% of the area planted with sugarcane in Brazil. In the 2017/2018 harvest, 13 billion liters of ethanol were produced, which corresponded to 47% of the Brazilian production," he said.

Cardoso has been analyzing the consequences of the [atmospheric pollution](#) in the sugarcane region of São Paulo since the end of the 1990s. His team has collected air samples in the city of Araraquara, in the interior of São Paulo, and measured the changes in the composition of the atmosphere between the harvest and inter-harvest period.

"We have seen, for example, that among the [particulate matter](#) there were sugarcane macronutrients. When this material falls on sugarcane plantations, great. However, when it falls on a natural forest, it can modify the soil and cause a loss of biodiversity," he said.

## **Manual versus mechanized harvesting**

Besides the State Law of 2002, an agreement signed between the sugar-alcohol industry and the State of São Paulo government envisaged the elimination of burning by 2017. According to the researcher, in the

2016/2017 harvest, the production harvested manually was 43.6 million tons, or 10% of the total harvest.

"These facts suggest that the sources of emissions have possibly changed in quality, but not in quantity," he said.

The researcher points out that one important change occurring with mechanization in harvests has been the growth in production of electrical energy and second generation (2G) ethanol, which is indicated as a way of increasing bioenergy generation without extending the area under cultivation. The leaves and other sugarcane parts with less energy value, which were burned before, have been used as raw material for producing energy and fuel.

"It seems that we have merely changed activity, but the pollution remains the same. But there are still many questions that I intend to answer with more studies," said Cardoso.

Provided by FAPESP

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