Environmental News Articles

**A Mezcal Boom Spurs Creative Approaches to Dwindling Agave**

Farmers in Oaxaca, Mexico, are counting plants and trying to take advantage of rising prices without pushing an important species towards extinction.

By **Alec Jacobson**

OAXACAThe windshield of Augustin Güendulain’s truck is cracked in the shape of an agave. The pickup is bent and battered bow to stern from years of abuse on Oaxacan backroads in the service of making mezcal, and, when I met him at a gas station in Miahuatlan a couple hours south of Oaxaca City, Güendulain had to fill a visibly low tire before I climbed into the bench seat.

There was a shot glass rolling around in the hole where the radio had once been. The crack is from a friend’s head: too much drinking and the truck had slipped off the road. Everyone survived and the truck still runs though. Güendulain laughed quietly as we rolled into the hills.

Many Americans have their own skull-jarring memories of drinking the worm at the bottom of a liter of firewater, but artisanal versions of mezcal have started to populate premium spirits menus around the world: no worms, smokey tasting notes, boutique pricing. If you’ve recently been to a bar where mustaches and unique cocktails predominate, you’ve probably seen a margarita with tequila replaced by it’s authentic, smokier brother mezcal. It’s traditionally a farmers’ drink, made in small batches to be sipped out of votive candle holders at festivals. Güendulain’s family has been making it for five generations. They’ve always sold to neighbors, often in recycled bottles, but the boom in international sales of mezcal has encouraged the family to think about new markets. Güendulain has joined a collective of 35 *maestros mezcaleros* who share the costs of maintaining a label. He’s also carefully watching after his family’s agave.

Mezcal production has roughly doubled since 2011, adding pressure in many new ways to what has long been an informal, almost moonshine, business. Though the shift has opened financial opportunities for some of Mexico’s poorest regions, the legacy of informality has left certain elements exposed, most vitally the future of agave.

The success of the tequila industry to the north in Jalisco poses a cautionary tale for many mezcaleros. Formally, tequila is a subset of mezcal made only of blue agave but it has grown its own separate branding equally as the fuel for frat parties and as an ultimate luxury. In that transition over time, the rich historical legacy has been squeezed into an often acerbic industrial standard, with massive fortunes concentrated in the hands of a few and with hundreds of planted hectares reduced to a single strain of genetically identical clones.

## A TRADITION IN FLUX

Mezcal’s history is tied to a rich diversity with more than 30 types of agave used to make the spirit, each yielding a different flavor and terroir ranging from tropical fruit to peat to gentle dust. In Oaxaca, it’s up to maestros mezcaleros like Güendulain to preserve that inheritance even as the spirit is being adopted by a hip cosmopolitan elite.

Right now, Oaxaca is three years into an agave crisis and the price per kilo of cultivated *espadin* is up to as much as 7 pesos per kilo from .5 pesos. This tends to happen every ten to twelve years as a crop of espadin matures en masse, prices drop, and farmers swear to never again plant agave—which leads to a new price spike.

Espadin needs five to six years to mature and so the cycle plays out with just enough delay to string everyone along. This time though, with the recent rise in the mezcal market, no one knows exactly how the cycle will play out, particularly because a new process in Jalisco can extract juice from agaves even before they’re mature.

When Güendulain had gassed the truck up and deemed it sufficiently roadworthy, he pointed us onto a dusty track running out of town. As we drove through the countryside, we rolled past a patchwork of small agave fields and other crops. The response to the current shortage could turn those into a sea of espadin to rival the rows of blue agave in Jalisco that stretch to the horizon like corn in Iowa. The more clear threat though is to the agave that’s not in fields. Most varietals are left to grow in the wild where they can take up to 35 years to mature.

After about 45 minutes, Güendulain pulled the truck off a narrow track outside the town of Amatlan and pointed out the agave stalks towering above the surrounding scrub brush. “Wild ones, we just go and cut them,” he said, “otherwise they just dry out.”

He and his field hand, Pedro Reyes, shouldered machetes and a massive crow bar and started picking through the undergrowth towards the masts swaying with seed pods. The spines of agave are sharp enough to draw blood through jeans, but Güendulain trimmed them off with a few expert machete strokes. The sap is caustic, so he called Reyes over to pry the *pinas* from the ground. The pair quickly cut nine agaves and rolled them down the slope to the truck.

Though wild agaves are abundant in many places now and the pair can generally cut 20 to 30 in a day, there’s a concern that the populations could tragically dwindle on the commons. The Consejo Regulador Mezcal—Mexico’s central agency for mezcal regulations—tracks some of the extraction of agaves, but there is no central effort to survey the population. There is one town in Guerrero where the residents formed a line and walked their communal land end to end to count their agaves, dividing them equally among all residents. Otherwise, no one is counting how many are out in the hills.

“We don’t know exactly how many are out there,” Güendulain said as we drove back towards town. “There’s one type, *papalote*. There used to be a lot, but not now.”

## A HARVEST IN TROUBLE?

Boom and bust cycles have always been part of the agave harvest, as clusters of one varietal or another mature simultaneously, but customers abroad don’t necessarily know that. Often, this is driving less sustainable business practices.

“Some people are marketing their mezcals like, ‘Drink this before it goes extinct,’ but that’s bullshit,” says Santiago Suarez, co-founder of Mezcal Amores. “Just plant more of those wild agaves.”

Suarez started sipping mezcal while working at an NGO in Oaxaca and realized that the spirit could be “a contemporary story of Mexico,” by introducing the heritage product to the international scene. In 2010, he launched the company with the core values of being sustainable, organic, fair trade and premium.

[Amores](http://mezcalamores.com/) is one of the largest mezcal brands on the market at the moment and they’re working to influence the industry to stabilize its future. He’s already turned down an offer from Jose Cuervo to buy Amores. Among other efforts, they’re experimenting with different methods of cultivating wild agave varietals. Suarez has watched harvesters cut the biggest plants from the wild like trophy hunters and so he’s starting to grow different agaves now before the herd is culled. Historically, farmers have shied away from the expense of investing decades in a single crop, but, says Suarez, “we plan to be here for a long time.”

Güendulain’s family started working towards the same goal years ago, planting wild seeds and sprouts among their rows of espadin. We stopped at his father’s *palenque* to chop down a row of bicuixe—taller agaves with narrow piñas—which are normally only found in the wild. In another field, Güendulain plucked clones sprouting from the base of *madrecuixe* and *coyote*, carefully loading the little succulents into the truck to replant in his own nursery. With these plants, he was securing his future.

Though the craft of making mezcal is centuries old, dating back to Mayan agave beer, the industry is still young and small—less than one percent the size of the tequila market—and its future is not set in stone. Every one of the agaves that Güendulain and Amores is sowing now will be important links to the spirit’s heirloom history and a vote for diversity.

# Earth Sets a Temperature Record for the Third Straight Year

# By [JUSTIN GILLIS](https://www.nytimes.com/by/justin-gillis)

Marking another milestone for a changing planet, scientists reported on Wednesday that the [Earth](http://topics.nytimes.com/top/news/science/topics/earth_planet/index.html?inline=nyt-classifier) reached its highest temperature on record in 2016, trouncing a record set only a year earlier, which beat one set in 2014. It is the first time in the modern era of [global warming](http://topics.nytimes.com/top/news/science/topics/globalwarming/index.html?inline=nyt-classifier) data that temperatures have blown past the previous record three years in a row.

The findings come two days before the inauguration of an American president who has called global warming a Chinese plot and vowed to roll back his predecessor’s efforts to cut emissions of heat-trapping gases.

In reality, the Earth is heating up, a point long beyond serious scientific dispute, but one becoming more evident as the records keep falling. Temperatures are heading toward levels that many experts believe will pose a profound threat to both the natural world and to human civilization.

In 2015 and 2016, the planetary warming was intensified by the weather pattern known as El Niño, in which the Pacific Ocean released a huge burst of energy and water vapor into the atmosphere. But the bigger factor in setting the records was the long-term trend of rising temperatures, which scientists say is being driven by increasing levels of carbon dioxide and other greenhouse gases.

“A single warm year is something of a curiosity,” said Deke Arndt, chief of global climate monitoring for the [National Oceanic and Atmospheric Administration](http://www.noaa.gov/). “It’s really the trend, and the fact that we’re punching at the ceiling every year now, that is the real indicator that we’re undergoing big changes.”

The heat extremes were especially pervasive in the Arctic, with temperatures in the fall running 20 to 30 degrees Fahrenheit above normal across large stretches of the Arctic Ocean. Sea ice in that region has been in precipitous decline for years, and Arctic communities are already wrestling with enormous problems, such as [rapid coastal erosion](https://www.nytimes.com/interactive/2016/11/29/science/alaska-global-warming.html), caused by the changing climate.

“What’s going on in the Arctic is really very impressive; this year was ridiculously off the chart,” said Gavin A. Schmidt, head of the [Goddard Institute for Space Studies](https://www.giss.nasa.gov/) in Manhattan, a unit of the National Aeronautics and Space Administration that tracks global temperatures.

But Arctic people were hardly alone in feeling the heat. Drought and starvation [afflicted Africa](https://www.theguardian.com/global-development/2016/nov/27/southern-africa-climate-change-drought-crop-failure). On May 19, the people in the town of Phalodi lived through the [hottest day](http://www.bbc.com/news/world-asia-india-36339523) in the recorded history of India, 123.8 degrees Fahrenheit.

El Niño has now ended, and climate scientists almost universally expect 2017 to be cooler than the year before. But the scale of the heat burst has been startling to many of the experts, and some of them fear an accelerated era of global warming could be at hand over the next few years.

Even at current temperatures, billions of tons of land ice are melting or sliding into the ocean. The sea is also absorbing most of the heat trapped by human emissions. Those factors are causing the ocean to rise at what appears to be an accelerating pace, and coastal communities in the United States are beginning to spend billions to fight [increased tidal flooding](https://www.nytimes.com/2016/09/04/science/flooding-of-coast-caused-by-global-warming-has-already-begun.html). Their pleas for help from Congress have largely been ignored.

The finding that a record had been set for the third year in a row was released on Wednesday by three government agencies, two of them American and one British, that track measurements made by ships, buoys and land-based weather stations. They analyze the figures to correct for known problems, producing an annual average temperature for the surface of the Earth. The national meteorological agency of Japan confirmed the findings in a preliminary analysis.

In the British data set, 2016 set a record by only a small amount; the margin was larger in the NOAA data set and larger still in NASA’s. NASA does more work than the other groups to take full account of Arctic temperatures, and several scientists said they believed the NASA record to be the most accurate for 2016 for that reason.

NASA’s calculations suggested that the planet had warmed by well over a half-degree Fahrenheit from 2013 to 2016. That is a huge change for the surface of an entire planet to undergo in just three years, and it appears to be the largest temperature increase over a three-year period in the NASA record, which begins in 1880.

The findings about a record-warm year were also confirmed by the [Berkeley Earth surface temperature](http://berkeleyearth.org/) project, a nonprofit California group set up to provide a temperature analysis independent of governments. That group, however, did not find that three records had been set in a row; in its analysis, 2010 was slightly warmer than 2014.

In addition to the surface measurements, satellites are used to measure the temperature of the atmosphere within a few miles of the surface. Two groups that analyze these figures showed a record-warm 2016 in data going back to 1978, though in one data set it was a record by only a small margin.

Since 1880, NOAA’s records show only one other instance when global temperature records were set three years in a row: in 1939, 1940 and 1941. The Earth has warmed so much in recent decades, however, that 1941 now ranks as only the 37th-warmest year on record.

The modern era of global warming began around 1970, after a long stretch of relatively flat temperatures, and the past three years mark the first time in that period that three records were set in a row. Of the 17 hottest years on record, 16 have now occurred since 2000.

Two of the agencies that issued Wednesday’s figures, NOAA and NASA, will soon report to cabinet secretaries appointed by President-elect Donald J. Trump, who has expressed doubt about the findings of climate science. In 2012, Mr. Trump wrote on Twitter, “The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing noncompetitive.”

Fear has erupted within the agencies about whether their data will now be subject to political manipulation. Mr. Trump and his cabinet nominees have given no detailed indication of what their broad climate policies are likely to be, much less how they will manage the scientific enterprise of monitoring the climate.

Since he was elected president, Mr. Trump has[acknowledged](https://www.nytimes.com/2016/11/23/us/politics/trump-new-york-times-interview-transcript.html) there may be “some connectivity” between human activity and climate change, and he promised to keep an open mind on the subject.

On Wednesday, in questioning before the Senate Environment and Public Works Committee, Mr. Trump’s nominee to lead the Environmental Protection Agency, Scott Pruitt, said, “[I do not believe that climate change is a hoax](http://www.mcclatchydc.com/news/politics-government/national-politics/article127163714.html).” He did not, however, say whether he believed that Mr. Trump was wrong on climate change.

The three record-setting years in a row undercut longstanding claims by a handful of contrarian scientists that global warming stopped after 1998. That argument was never backed by good statistical evidence, but it was highlighted repeatedly in Congress and on the presidential campaign trail in 2016.

When the heat buildup in the ocean is taken into account, global temperatures are rising relentlessly. Scientists have calculated that the heat accumulating throughout the Earth because of human emissions is roughly equal to the energy that would be released by 400,000 Hiroshima atomic bombs exploding across the planet every day.

It is true that at the Earth’s surface, the warming seems to be proceeding in fits and starts. “The arc of global warming will be variously steep and less steep,” said Richard Seager, a climate scientist at the [Lamont-Doherty Earth Observatory of Columbia University](http://www.ldeo.columbia.edu/). “It never stopped.”

In fact, the rate over time has been reasonably close to predictions that scientists first offered decades ago. Those same scientists have long warned that humanity is courting disaster by failing to bring fossil-fuel emissions under control.

For example, many experts on sea level believe that a rise of 15 or 20 feet has already become inevitable, though they cannot say how fast it will happen. A rise that large would drown most of the world’s coastal cities without heroic efforts to fortify them.