

Legalizing marijuana and the new science of weed

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Marijuana buds are often two to three times as potent as they were 30 years ago. Credit: Charas Scientific (for the photo) and American Chemical Society (for the video)

More than a year into Colorado's experiment legalizing marijuana, labs testing the plants are able for the first time to take stock of the drug's potency and contaminants—and openly paint a picture of what's in today's weed. At the 249th National Meeting & Exposition of the American Chemical Society (ACS), one such lab will present trends—and some surprises—that its preliminary testing has revealed about the marijuana now on the market.

Three major patterns have emerged over the past few months since Andy LaFrate, Ph.D., and his lab began testing [marijuana](#) samples. Those patterns concern potency, amounts of a substance called CBD and contaminants in the products.

"As far as potency goes, it's been surprising how strong a lot of the marijuana is," LaFrate says. "We've seen potency values close to 30 percent THC, which is huge." LaFrate is the president and director of research of Charas Scientific, one of eight labs certified by Colorado to do potency

testing.

THC is an abbreviation for tetrahydrocannabinol, which is the psychoactive compound in the plant. He explains that three decades ago, THC levels were well below 10 percent. Its content has tripled in some strains because producers have been cross-breeding them over the years to meet user demands for higher potency, he says.

But an unexpected consequence of this breeding has occurred, says LaFrate. Many of the samples his lab has tested have little to no cannabidiol, or CBD. CBD is a lesser known compound in marijuana that is of increasing interest to [medical marijuana](#) proponents. Researchers are investigating CBD as a treatment for schizophrenia, Huntington's disease and Alzheimer's disease. It is also being considered for anxiety and depression. But unlike THC, CBD doesn't get people high—that's a key trait for many people who are wary of buzz-inducing drugs and for potential medical treatments for children. As for recreational users, the lack of CBD in marijuana means that many of the hundreds of strains they select from could in actuality be very similar chemically, according to LaFrate.

"There's a lot of homogeneity whether you're talking medical or retail level," he says. "One plant might have green leaves and another purple, and the absolute amount of cannabinoids might change, which relates to strength. But the ratio of THC to CBD to other cannabinoids isn't changing a whole lot." That means there might be little difference in how the varieties make you feel, even though some people claim one kind will make you mellow and another will make you alert, LaFrate explains.

As for contamination testing, although Colorado doesn't yet require it, some producers have voluntarily submitted samples to see what's in their products. LaFrate says the results have been surprising. His lab looks for both biological and

chemical contaminants, such as pathogenic microbes and solvents.

"It's pretty startling just how dirty a lot of this stuff is," he says. "You'll see a marijuana bud that looks beautiful. And then we run it through a biological assay, and we see that it's covered in fungi."

The lab also finds varying levels of [chemical contaminants](#) such as butane, which is used to create marijuana extracts. Contamination isn't necessarily a cause for alarm, but it does signal a need to figure out what levels are safe.

"It's a natural product," LaFrate says. "There's going to be microbial growth on it no matter what you do. So the questions become: What's a safe threshold? And which contaminants do we need to be concerned about?"

In other words, [legalizing marijuana](#) has raised a lot of issues that still have to be hammered out. LaFrate, who has been involved with the policy side of Colorado's new marijuana market, as well as the laboratory side, says he expects regulations will continue to evolve as scientists, lawmakers and others learn more about the plant and its products.

More information: State mandated testing of retail marijuana in Colorado, 249th National Meeting & Exposition of the American Chemical Society (ACS).

Abstract

In 2012, Colorado voters approved Amendment 64 which legalized the sale of recreational marijuana to adults age 21 and over. Written into the amendment were provisions that require all products to be tested for cannabinoid potency and contaminants prior to sale. The Marijuana Enforcement Division (MED) within the State's Department of Revenue had been regulating medical marijuana for years and was tasked with setting rules for the mandatory testing program. This presentation will summarize marijuana testing rules in Colorado, methods used for testing and an overview of test results for recreational marijuana. The law requires every "batch" to be tested for several different chemical and biological entities and the rules are quite complex. Methods such as

high performance liquid chromatography (HPLC), gas chromatography (GC), mass spectrometry (LCMS), microbial culture and real time polymerase chain reaction (PCR) are utilized in testing. The results obtained are both fascinating and shocking and offer a scientific glimpse at an industry in its infancy.

Provided by American Chemical Society

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