Labs Begin Testing for Terpenes

Two labs have begun testing cannabis samples for terpenes. The Werc Shop began doing so in June and now has a validated method of identifying "about 30 different terpenes," says owner Jeff Raber.

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"This is definitely where the variability in strains comes from," says Raber, although he has gotten very little feedback from patients linking specific compounds to specific effects. "The ones containing pinene are uplifting, fairly consistently."

Raber has identified terpineol as "a unique terpene in 'Jack Herer' and some of the 'Jack' crosses like J-1.

"That's the only one that jumps out at me, so far," he said in late August. "We haven't had many people wanting to do the test for it."

Terpineol is commonly found in pines and other conifers that produce turpentine, and in Eucalyptus sap. Cannabis strains other than Jack Herer will be found to contain terpineol, we can say with certainty, because it was one of the beneficial terpenes described in MacPartland and Russo's landmark 2001 paper in the *Journal of Cannabis Therapeutics*. They wrote:

"α-Terpineol, terpinen-4-ol, and 4-terpineol are three closely related monoterpenoids. Inhalation of α-terpineol reduced mouse motility 45% (Buchbauer *et al* 1993). Burits and Bucar (2000) demonstrated that 4-terpineol exhibits "respectable" radical scavenging and antioxidant properties. Terpinen-4-ol, α-terpineol, and α-pinene demonstrated dose-dependent antibiotic properties against *Staphylococcus aureus, S. epidermidis* and *Propionibacterium* acnes (Raman et al 1995). Similar studies have demonstrated antimicrobial activity against a wide range of pathogenic organisms, excluding *Pseudomonas* (Carson and Riley 1995). Campbell *et al* (1997) have demonstrated a moderate antimalarial effect against two strains of *Plasmodium falciparum* by an essential oil with major α-terpineol and α-caryophyllene components."

Raber uses a mass spectrometer (MS) to detect the presence of terpenes and a gas chromatograph with a flame ionization detector (GC-FID) to measure quantity. Whereas THC levels exceeding 10% are common in California cannabis nowadays, Raber says that it is not common for many terpenes to exceeded one percent. "But there are so many, that when you add up all those fractions of a percent, they might account for as much as four percent of the weight, creating a profound physiological impact."

Donald Land of Halent Labs in Davis, who uses liquid-chromatography-mass spectrometry to test for terpenes, informs us that "Cannabinoids are, in fact, a subclass of terpenes, though they are seldom referred to as such. Since these particular terpenes are only produced in cannabis and all derive from the parent compound, cannabigerol acid (CBGA), they are most often referred to by their more specific moniker, 'cannabinoids.'"

Land teaches analytical chemistry at UC Davis. He says that THC and CBD account for about 75% of a cannabis plant's essential oil. The so-called "minor cannabinoids" account for another 5-6%. And the compounds Land defines as "additional terpenoids" (that are not unique to the cannabis plant) make up another 5-6%.

Halent also tests for a number of "minor" cannabinoids. Out-of-the-ordinary strains identified to date include ones containing THCVA (5.5%), THCV (3%), CBDA (14%), and CBCA (1%), and CBLA (cannabicyclol, 2%).

SCC Presentations in Jerusalem

Willits-based William Courtney, MD, and his partner Kristen Peskuski each presented posters at the conference in Israel. Hers described a study involving eight subjects to determine whether ingesting fresh Cannabis buds has a psychoactive effect. (In the plant THC exists in its acid form, THCA. After harvest, heat changes it to the psychoactive neutral form.)

"Five volunteers were heavy users, two were accustomed to only leaf, and one was naive to cannabis," Peskuski reported. "Raw flowers were eaten for a two-week period; only psychoactive effects were examined. None of the patients felt euphoria or dysphoria from fresh cannabis flower consumption."

Courtney's poster, "Conditionally Essential and Essential Cannabinoid Acids," advocated consuming cannabinoid acids in large quantity to bolster the immune system. Having monitored consumption of juiced raw bud and leaf by thousands of patients, Courtney concluded that it results in "improved relief, and dramatic reduction in NSAIDs and analgesic use."

Jeffrey Hergenrather, MD, of Sebastopol presented a poster co-authored by Stacey Kerr, MD, of Santa Rosa, "Clinical Improvement and Reduction of Immuno-Suppressive Drug Therapy in Cannabis-Treated Patients With Inflammatory Bowel Disease." The study involved a chart review of 38 patients with inflammatory bowel disease who used Cannabis for symptom relief. "All patients studied had an independent diagnosis of Crohn's disease or ulcerative colitis. Inclusion criteria included the completion of a questionnaire designed to elicit details of the clinical course and use of all medications, including Cannabis.

William Courtney, MD (right) with Israeli researcher Zvi Vogel.

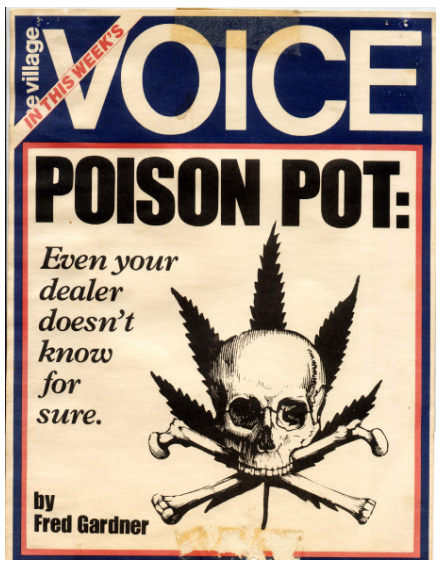
"Results indicate that these patients found statistically significant improvement of their clinical course and a marked reduction or discontinuation of conventional pharmaceutical therapy associated with the regular use of Cannabis. Cannabis serves as an effective immunomodulator, antispasmodic and appetite stimulant with a wide margin of safety and freedom of undesirable adverse effects compared with conventional pharmacotherapy."

Hergenrather continues to add new patients to the study and data from ongoing patients. He has been invited to present his most recent findings at the International Association of Cannabinoid Medicine meeting in Bonn in September.

Jackie Robinsons of Analytical Chemistry

PHARM CHEM IN MENLO PARK was the first private-sector analytic lab to test marijuana —back in the 1970s. Marijuana smokers were concerned that herb imported from Mexico might contain paraquat, an herbicide known to cause lung damage if inhaled. The U.S. government had orchestrated an aerial eradication program that the Mexican Army carried out with the help of DEA advisors. Some 10,000 acres of marijuana were sprayed in 1975, mainly around Sinaloa. But the campesinos would harvest the plants immediately after the helicopters flew off, before the herbicide took effect and destroyed the buds. The dried herb wound up being sold and smoked.

By the mid-1980s, many Fortune 500 companies were using Pharm Chem to test employees' urine for illicit drug metabolites, and the company was grossing millions. The chemist who founded the lab had a crisis of conscience, sold out, and moved to Oregon, where he devoted himself to fly fishing.



David Lampach, co-founder of Steep Hill, the first lab to serve the medical cannabis industry, announces another first: technology that he says will enable dispensaries to evaluate cannabis onsite. Sensors at the dispensary, controlled by servers at the lab, measure THC, CBD, THCA, and moisture content. "Test data is processed offsite via the internet and results are returned in less than 80 seconds," says Lampach.

ULTRA-FAST LIQUID CHROMATOGRAPHY SYSTEM from Shimadzu Scientific Instruments is used by The Werc Shop, the first lab to test Cannabis in Southern California (and the first in California to test for terpenes). Components at right are a photo-diode-array detector on top of a column (in housing) through which molecules pass selectively based on a selected solvent. As each chemical leaves the column and reaches the detector, a signal is received by the computer (at left) and translated by software into weight percentages of the sample. Third from left are a control box on top of an autosampler which is responsible for repeatable and accurate injection of sample onto the column. Second from left: bottles containing different solvents are used in constantly changing ratios to create a gradient designed to selectively remove molecules from the column based on their chemical properties. Below the solvent bottles are the two pumps used to move the solvents through the system in ratios that will create the desired gradient mixture.