



**PRESENTER**  
**TJ ARNOVICK**  
 Founder & CEO | The Original Resinator

## ABSTRACT

Lyophilization or freeze drying of cannabis flower can be used to improve potency, appearance, and shelf life by avoiding the traditional dry and cure process. The traditional dry and cure process degrades potency and results in oxidation and shrinkage of buds (AL Ubeed et al.). Proper lyophilization techniques can eliminate the traditional dry process and expedite cure time. Cannabis flowers maintained in a cold chain can maintain their quality up to 2 years. The flower can be stored in chest freezers (-4F) for a period of a year and then after they have been freeze dried they are shelf stable in a temperature controlled environment for up to another year (Zamengo et al.). This breakthrough process allows for producers to freeze dry flower once there is demand for a certain cultivar. The freeze drying process takes 20-22 hours and then the cure is accomplished rapidly thereafter, upon exposure to oxygen. The cure process completes within 1-3 days post-lyophilization. Through this process the cannabis is dried, cured, and trimmed within a 2 day period, presenting a much needed revolution to the cannabis supply chain. The throughput of freeze dry equipment is maximized, with the cold storage step offering a material staging area for up to a year. Through this method one can freeze dry up to 350lb in a year off a single small scale freeze dryer, or up to 5,200 lb per year with commercial-scale freeze drying options. Freeze dried cannabis product quality is easily discernible as premium due to the absence of degradation of the inflorescences compared to a traditional dry and cure method. Larger greener buds with higher cannabinoid content (on average 2% higher potency) is desirable for consumers with a smoke that feels less harsh.

## OUR BACKGROUND

The Original Resinator manufactures a CO2 powered tumbler that can be used to sift, trim, or wash cannabis under cryogenic conditions. The machine uses CO2 to freeze flower, allowing it to maintain a cold chain from harvest through trim and into a freeze dryer. The Original Resinator has put an extensive amount of research and development toward our Crop-to-Cure® in 24 hours method, which freeze dries, cures, and trims marijuana in 24 hours. We have proven our technology with some of the least expensive equipment available to make the process affordable to the home grower and scaled it to a level of precision with the commercial units we designed for large scale operations. The Cryo-Trim® function of our tumbler produces noteworthy results in terms of bud appearance and also loses less than 0.1% cannabinoid content. The freeze dry process prevents degradation of cannabinoids and thus results in higher potency. This paired with a near lossless trimmer, (most hand trimmers lost 2-5% potency) creates a process suited to maintain the highest possible cannabinoid content in your bud. CO2 can also be used to sift material at cryogenic temperatures in order to produce kief for the next extraction step, be it rosin pressing or co2/ethanol/hydrocarbon extraction. Extracting sifted material increases throughput and lowers solvent costs in CO2, hydrocarbon, or ethanol processing.

## WORKS CITED

AL Ubeed, Hebah Muhsien Sabiah, et al. "Post-Harvest Operations to Generate High-Quality Medicinal Cannabis Products: A Systemic Review." NCBI, 6 March 2022, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8911901/>. Accessed 19 January 2023.

Zamengo, Luca, et al. "The role of time and storage conditions on the composition of hashish and marijuana samples: A four-year study." Science Direct, 2019, <https://www.sciencedirect.com/science/article/abs/pii/S0379073818308818>. Accessed 19 January 2023.

# PROPERLY LYOPHILIZED Cannabis Flower Leads to Increased Potency and Terpene Retention

## SIDE-BY-SIDE ANALYSIS

STRAIN: ATLAS STAR

SAME PLANT  
 HARVESTED SAME DAY

TRADITIONAL

VS.

LIVE DRIED

### OVERALL BATCH RESULT

13.38	TOTAL CALCULATED D9-THC (%)	17.01
0.07	TOTAL CALCULATED CBD (%)	0.09
15.80	TOTAL CANNABINOIDS (%)	20.26
8.13	PERCENT MOISTURE (%)	13.36

### POTENCY TEST RESULT

SOP: [SLW-CC] Method: HPLC

0.84 mg/g	CBDA	1.02 mg/g
4.39 mg/g	CBGA	7.17 mg/g
0.71 mg/g	CBG	0.89 mg/g
148.57 mg/g	THCA	190.46 mg/g
3.50 mg/g	D9-THC	3.05 mg/g



SCAN ME

## BENEFITS OF LIVE DRIED

1. Retains shape, size, color & flavor.
2. Preserves terpenes and cannabinoids resulting in up to 3-4% more potency in COA's.
3. No loss of volume (zero shrinkage).
4. No need for lengthy drying and curing time or dedicated dry space.
5. Enables cultivators to take a plant from harvest to market in a fraction of the time.
6. Can be done in variable batch sizes from a single plant to commercial scale.
7. Mitigates development of mold & pest.
8. Creates a true differentiated and genuinely premium product of "live" smokable flower.

## THE PROCESS

### WHAT IS CRYO-TRIMMING®?

Cryo-Trimming® means trimming cannabis flower, frozen, wet or dry, using liquid CO2 combined with mesh trim screens to gently and quickly induce sugar leaf detachment from buds without the use of scissors or blades. This process results in lowered total cannabinoid loss compared to hand trimming (0.03% - 0.08% versus 1-2% for hand trimmed cannabis). This process enables operators to trim up to 300 lbs per shift with ease.

### WHAT IS FREEZE DRYING?

Freeze drying cannabis or hemp is the process of removing water from cannabis as water vapor through sublimation. With the biomass vacuum sealed and frozen during the process, bud shrinkage is eliminated, resulting in near-perfect preservation.

### WHY FREEZE DRY?

It's simple: it can take two weeks to a month to get cannabis ready for market. With freeze drying, you can do that in less than a day. This means the freeze drying process delivers a product that is cured like it has been traditionally dried and cured for thirty days, but with a higher added value.

