THE ULTIMATE NERD'S GUIDE TO CURING CANNABIS

TWISTER
TECHNOLOGIES

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Topics and key terms found in this guide...

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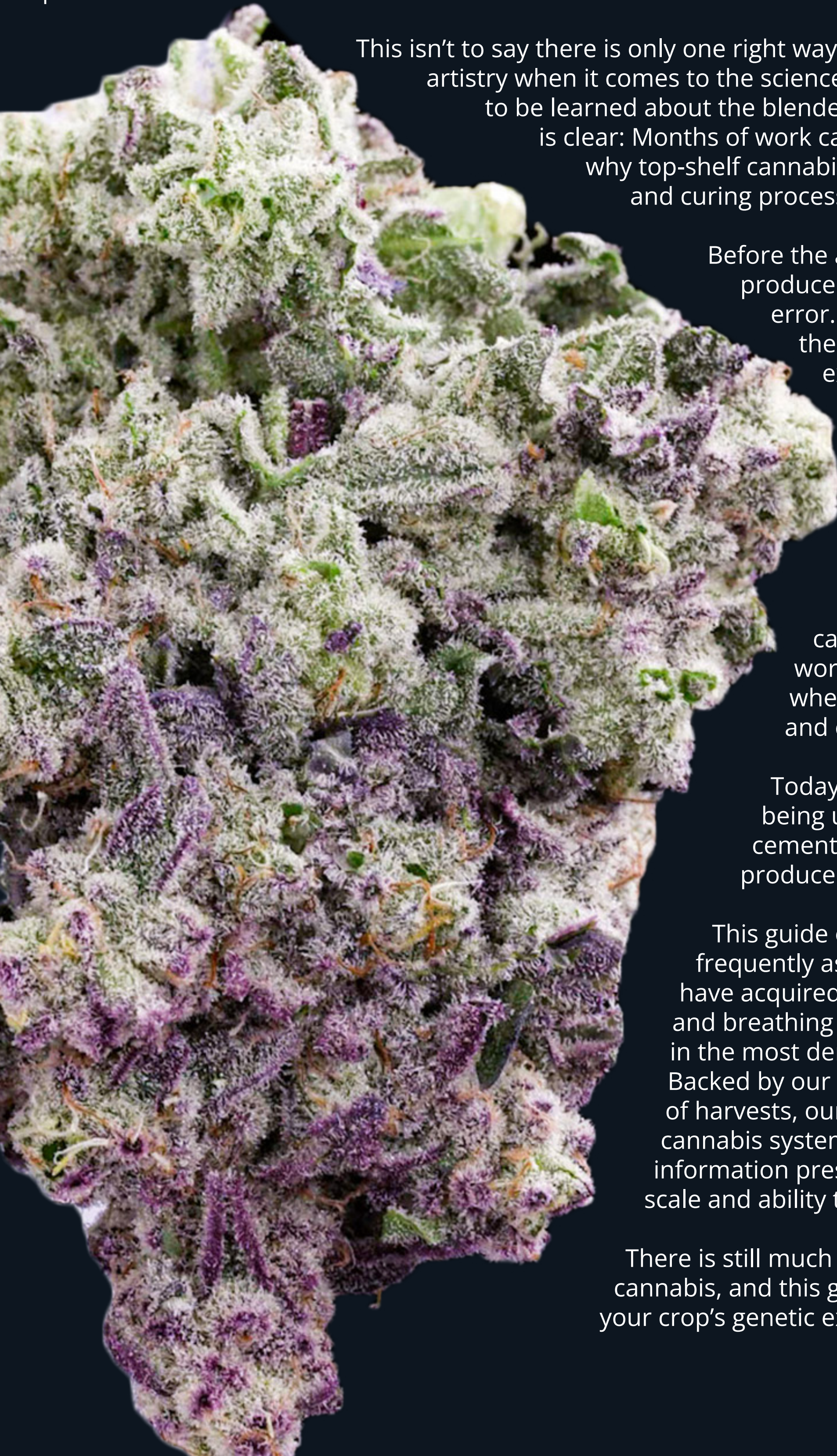
Picture the most perfect nug you've ever seen. Feel its squishiness between your fingers as it puffs back up like a fresh marshmallow. The stems snap as you peel off gooey, sticky flowers as the spicy and earthy perfume wafts up, hitting your olfactory senses like a runaway freight train.

You grind it up. The milled remains glue themselves to your fingers as you roll the joint. You spark your lighter, pulling a smooth, clean burn. Your exhale leaves you wanting another, so you take a second puff before passing it around.

That is the experience you get from well-cured cannabis. Those incredible, sticky, deliciously enticing flowers are unfortunately few and far between on most dispensary store shelves. But that isn't because the curing process is the result of alchemy. On the contrary, anybody can establish the proper curing process that brings your flowers to their peak aroma and flavour.



This isn't to say there is only one right way to cure cannabis–there is plenty of room for artistry when it comes to the science of curing cannabis. Yet while there is still much to be learned about the blended art and science of curing cannabis, one thing is clear: Months of work can be refined or ruined in these final steps. That's why top-shelf cannabis producers don't cut corners during the drying and curing process.

Before the advent of the internet, underground cannabis producers honed their craft mostly through trial and error. With no direct cannabis science to support their curing practices, growers would individually experiment with different dry and cure times, burping intervals, and moisture contents.

These small-scale experiments were done by thousands of growers. Every harvest, as they experimented with glass jars and various sealed containers, it became clear how different curing methods could improve or destroy the smell, taste, and shelf life of their cannabis. Best practices slowly spread through word-of-mouth, and eventually on web forums, where the number of conversations about drying and curing exploded.

Today, while more science to support curing is still being uncovered, the practice of curing cannabis has cemented itself as a necessity amongst those who produce the best quality products.

This guide offers a mixture of best practices, tips, tricks, and frequently asked questions that we at Twister Technologies have acquired in the more than two decades we have living and breathing high-quality commercial and craft cannabis in the most demanding connoisseur markets in the world. Backed by our trials and errors collected through thousands of harvests, our structured experiments as a post-harvest cannabis systems manufacturer, and third-party testing, the information presented here will help any cannabis grower of any scale and ability to get the most out of their crop.

There is still much to learn about the art and science of curing cannabis, and this guide will help you on your journey to maximizing your crop's genetic expression.

– THE NERDS

Why cure cannabis?

A properly executed cannabis curing process removes excess water from the biomass as slowly as possible while feeding enzymatic activity, as well as stabilizes water activity and moisture content within the flowers.

A great cure offers a swath of benefits to your final product, the most consumer-oriented one being increased aromatic qualities and an improved consumer experience. Well-cured cannabis retains more of its aromatic compounds, terpenes, esters, flavonoids, and terpenoids, among others. Consumers report whiter ash and cleaner burns when their cannabis is properly dried and cured (we'll talk more about what is behind these qualitative benefits later).

For commercial craft producers whose flower has to work its way through the lengthy distribution and retail supply chain, your product may take months to reach your end consumer. This makes shelf life critical for your brand. Establishing a proper curing and drying process ensures that the cannabis is packaged when it reaches its best expression and, with solid packaging, can stay that way during transport and stocking. Also, by properly controlling the moisture content, cultivators can maximize their product's potency (which is measured relative to its dry weight).

How to dry cannabis

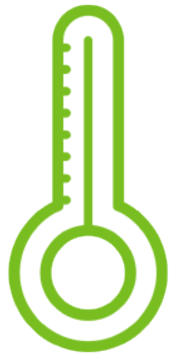
Both drying and curing processes require a controlled environment and a general understanding of water activity. While it is possible to dry and cure cannabis in a single step, splitting the process into two distinct stages will provide more moisture control, allowing you to produce better, more consistent results.

The first step, drying, is critical and often where growers make mistakes. When misfires happen during the drying stage, curing will not be as successful. Drying the cannabis first removes the bulk of the moisture from the flower. This moisture must be removed quickly enough to prevent mold and mildew growth, yet slow enough to prevent the evaporation of desirable volatile organic compounds (VOCs) and ensure a great cure.

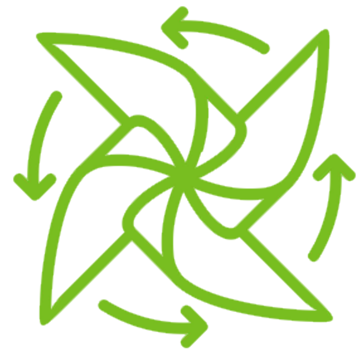
Drying Continued

There are three critical parameters that growers need to monitor during the drying process:

Relative Humidity



Temperature



Airflow

Relative humidity (RH) is influenced by temperature–the relationship between the two is inversely proportional, meaning that as temperature increases, relative humidity decreases. As temperature increases, relative humidity decreases.

The relative humidity in the drying room should be set between 50% and 62%, while the temperature should be set between 60 and 65 degrees Fahrenheit. Maintaining these levels will ensure that the surrounding air can pull moisture from the drying cannabis at the proper rate.

Many commercial growers will set their dry rooms to 60% RH and 60°F, or 62% RH and 62°F. While these settings are effective, fine-tuning the drying environment can yield even better results. For example, when drying large nugs, setting the RH to 50% and the temperature to 65°F for the first two days can help pull moisture out faster from the center of the flower, preventing mold. We can then incrementally increase the RH to 62% and decrease the temperature to 60°F for the next 10 days.

Keep in mind that every drying room is different, and these recommended setpoints are guideposts. Room and equipment size, amount of flower being dried, sensor placement, and equipment controls will all influence your ideal room temperature and humidity settings. Additionally, thermostat and humidistat deadbands (the amount of environmental change required for the devices to record a change) also play a significant role in dry times, with large deadbands leading to far less precise readings.

Aim to have a constant, gentle airflow in your drying environment. Ensure there are no thermal layers (i.e. microclimates), and that your fan use is kept to a minimum. Fans can cause areas to over-dry, ruining your work and hitting your bottom line. (Overdried cannabis can weigh 5% - 10% less than well-cured cannabis. This translates to a $50 - $100 loss for every $1,000 sold and doesn't account for quality-related price drops.) Laminar flow in dry rooms is a great tool to use to ensure evenly distributed airflow.

Curing

When is the flower ready for curing?

The transition from the dry room to curing is the most overlooked and misunderstood step in the process. If the flower is moved over too wet, it risks developing mold during the curing stage. If it is moved too dry, curing is impossible as moisture is required for the biosynthesis and respiration activities.

Drying is complete and the flower is ready for curing based on the water activity of the flower. The ideal water activity is in the 0.61-0.65 range, with variance based on genetics and grower experience.

In our experience, flower coming from the dry room with a water activity over .60 - .62 will produce consistent safe results. Water activity greater than .62 can often producer better results but it comes with a slightly higher risk of developing mold that requires a tightly controlled curing process to prevent. Water activity below .58 limits the effectiveness of curing as the flower does not contain enough moisture to effectively cure, negatively impacting aromatic expressions, shelf life, product consistency, color, and texture.

50% - 53% (.50 a_w - .53 a_w): Very dry, no benefit from curing.
54% - 56% (.54 a_w - .56 a_w): Dry, minor benefit from curing.
57% - 59% (.57 a_w - .59 a_w): Some moisture, some benefit from curing.
60% - 62% (.60 a_w - .62 a_w): Great moisture, significant benefit from curing.
63% - 65% (.63 a_w - .65 a_w): Significant moisture, significant benefit from curing.
Risk of mold if not monitored closely.
65% and up (.65 a_w and up): Too much moisture, needs further drying.

Once dried, the sugar leaves on the flower should feel slightly crispy. The stems inside of the flower should ***almost*** snap. If stems inside the flower do snap, that is a sign there is little to no moisture left in the flower. This results in dramatically reduced or even nonexistent enzymatic activity and respiration.

The longer you can maintain proper moisture in the flower, the longer the cure cycle can run. Achieving the optimal water activity before moving to the curing stage typically will take 10-12 days. Trying to cut down on dry time by increasing temperature or airflow, or by decreasing RH, will likely yield overdried cannabis.

"Once dried, the sugar leaves on the flower should feel slightly **crispy**. The stems inside of the flower should ***almost*** snap"

How to Cure Cannabis Well

Curing takes place after a cannabis plant has been cut down and most of the moisture has been removed through the drying process resulting in an ~80% reduction from its original wet weight. Curing cannabis preserves, enhances, and stabilizes the properties that influence cannabis quality, including flavor, aroma, potency, water activity, and shelf life.

Curing removes the remaining unwanted water content in a slow and stable process executed in a cool environment. During the curing process, biosynthesis and respiration activities are extended, which in turn allows enzymatic reactions to take place. These enzymatic reactions break down glucose, starches, and chlorophyll, improving flavor and aroma.

These reactions create other compounds such as cannabinoids and terpenes. Further polymerization of terpenes and other organic compounds form larger, more complex molecules that contribute to the unique characteristics of different cannabis strains.

During the first week of curing, the flower may have a hay-like or earthy aroma. Over week two, this scent will start to morph. In week three, the earthy smell is supported by a sweeter undertone, and buds get increasingly sticky as oils and moisture build up in the trichome heads on the flower's surface.

If your flower is not very sticky after undergoing a curing process, it is a good indication you had very low trichome content or you did a poor job curing. Trichomes that are overdried have a sandy texture. The most common reasons for a cure lacking fragrance are over-drying in the dry room, or having poor environmental control during your curing stage. Know that heat is a terpene killer–monoterpenes boil off at near room temperatures. Be sure to keep buds between 60°F and 65°F during the drying process, but do not go below that threshold. Temperatures below 60°F will slow or halt enzymatic activity.

How long does curing cannabis take?

The time it takes to cure cannabis depends on a myriad of factors, with the most important being the moisture content or water activity of the flower.
If cannabis is overdried, executing a good cure becomes near impossible. In the case of "cooked" cannabis, there is no point trying to cure, as enzymatic activity won't be possible to produce.

> "At minimum, **10 days** is recommended for curing."

The slower the moisture can be removed and made uniform throughout the bud structure, the longer the curing process will take. At minimum, 10 days is recommended for curing. Often, changes such as a sweeter aroma are not noticeable until the third week of curing.

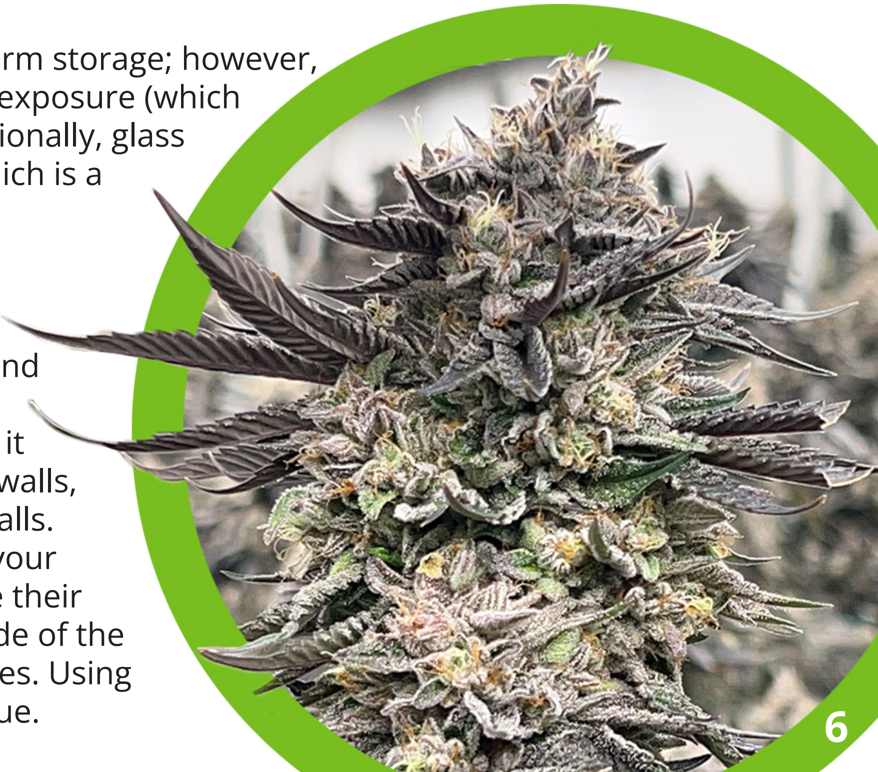
During the cure, growers have the opportunity to assess where their product is along the process when "burping" their containers. As cannabis cures, enzymes consume oxygen and release various amounts of gases, including CO_2, ethylene, and water vapor. Burping allows fresh air to enter the container and release that gas buildup.

It could be necessary to burp multiple times per day, especially during the first few days of curing, with the frequency dropping to once every few days as the cure progresses. Historically, growers have used these burps to assess where their flower is at in its curing process, using their olfactory senses and experience as guides. Sometimes, handheld devices support the grower's smell test.

What is the best container in which to cure cannabis?

Once the flower has been dried and rests in the ideal water activity range, it must be moved into a chamber or container that has precise environmental controls for curing. When it comes to container selection, a general rule is: wide and shallow is better than deep and narrow.

Glass is a great material for long-term storage; however, clear glass opens the buds to light exposure (which risks degrading the product). Additionally, glass breaks completely ruin a batch, which is a bummer in a home grow and disastrous in a commercial setting.



Food-safe plastic buckets or totes work well, are very cost-effective, and often stack well. A drawback to plastic is that, in some dry regions, it builds a static charge on the inner walls, causing trichomes to stick to the walls. This creates an avoidable mess in your curing area and causes bins to lose their stackability advantage as the outside of the nested bins get covered in trichomes. Using bin liners can help mitigate this issue.

Wax-lined Kraft or Fiber barrels work well due to their tight seal. Barrels should be placed on their side to decrease the depth of the flower (meaning how many vertical layers sit in the barrel). Laying the barrel on its side also provides the buds with more exposure to the headspace. The downside is the exterior of craft barrels cannot be washed, nor can they be stacked.

If cost is not an issue, stainless steel containers provide the best option.

No matter which containing type you use, make sure to leave enough headspace for gases to accumulate when filling your curing container. The headspace in the container – the air above the flower – will accumulate the gas and moisture produced by biosynthesis and respiration in the curing process and the stabilizing of water activity.

Ideally, the container should be 50% full. That said, limited space in commercial settings may force operations to fill their containers beyond the ideal 50% target. In those cases, the container should never be more than 75% full, as insufficient headspace is detrimental to the curing process.

Cure on the Stalk or off the Stalk?

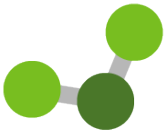
Another decision growers will need to make at the outset of the curing process is whether to remove the flowers from the stalk after drying or once the curing process is complete. Curing on the stalk will typically produce an incrementally better finished product as keeping the stalk allows the flower to pull moisture from it, allowing biosynthesis to continue for longer.

There is one disadvantage to this method: trimming. Trimming between drying and curing will often be much easier (and therefore faster, often 2x as fast) because the leaves are often slightly crispy following the drying process.

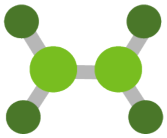
Because most markets do not compensate for the incremental improvement of curing on the stalk, it is not recommended for commercial applications. Curing on the stalk is best saved for those trying to produce the best of the best or win a competition.

What happens during the cannabis curing process?

During the curing process, some chemical and biological reactions take place, producing varying small amounts of various compounds. These include:

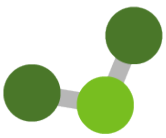


Carbon dioxide (CO2) – As the cannabis cures, some aerobic bacteria and other microorganisms continue to consume organic matter, which can release carbon dioxide as a metabolic byproduct.

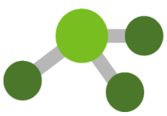


Ethylene – Ethylene is a naturally occurring plant hormone that can be released by some plant tissues during the curing process. It is known to play a role in plant maturation and the ripening of fruits.

Terpenes – Terpenes are volatile organic compounds (VOCs) that give cannabis its characteristic smell and flavor. While not gases themselves, they can vaporize and become airborne during the curing process. Some common terpenes found in cannabis include myrcene, limonene, and pinene.



Water vapor – As cannabis flower lose moisture during the curing process, water evaporates and is released as vapor.



Ammonia – When too much moisture is present, ammonia is produced.

Oxygen plays both a positive and negative role in curing. Oxygen provides the required fuel for beneficial aerobic activity, but it also causes oxidation.

Aerobic bacteria play a beneficial role in the cannabis curing process and require oxygen to survive and thrive, which is why it is essential to provide adequate airflow during the curing process. During curing, the remaining moisture in the cannabis buds is slowly released, and the chemical composition of the buds is altered. This process can be enhanced by the presence of aerobic bacteria, which consume sugars and other organic compounds present in the plant material, releasing enzymes and other beneficial compounds that can improve the flavor, aroma, and overall quality of the final product.

Oxidation in dried cannabis refers to the breakdown of organic compounds, such as cannabinoids and terpenes, due to exposure to oxygen. Over time, this process can cause a loss of potency, undesirable changes in flavor and aroma, and deterioration in appearance.

To prevent oxidation in cannabis once it has been cured, it is important to store it in airtight containers in a cool, dry, and dark place.

Key Definitions

Oxidation: In chemistry, oxidation refers to a chemical reaction in which a substance loses electrons, increases its oxidation state, or gains oxygen. During oxidation, the substance undergoing the process is said to be oxidized.

Polymerization: Polymerization is a chemical reaction in which small molecules, called monomers, are combined to form larger molecules, called polymers. This process involves the formation of covalent bonds between the monomers, resulting in a chain-like structure. Polymerization can occur through various mechanisms, including addition polymerization, condensation polymerization, and ring-opening polymerization.

Polymerization, in addition to oxidation, is another important chemical reaction that occurs during the curing process. Polymerization in dried cannabis is not a deliberate process, but rather a result of the complex interactions between the organic compounds in the plant during curing.

During curing, enzymes and microorganisms present in the plant can catalyze the breakdown of certain compounds and the formation of others, resulting in changes to the flavor, aroma, and effects of the cannabis. This process involves the polymerization of terpenes and other organic compounds, which can form larger, more complex molecules that contribute to the unique characteristics of different cannabis strains.

Proper curing techniques, including careful control of temperature and humidity, can help ensure that the desired chemical reactions occur and result in high-quality cannabis with desirable flavor, aroma, and effects.

What is the difference between Respiration and Biosynthesis?

Respiration and biosynthesis are two distinct processes that occur in living organisms.

Respiration is the process by which living organisms break down stored organic matter, such as carbohydrates, to produce energy for cellular activities. This process requires oxygen and releases carbon dioxide as a by-product.

Biosynthesis, on the other hand, is the process by which living organisms create new organic matter, such as proteins and other complex molecules, from simpler compounds. In cannabis, biosynthesis is responsible for the production of cannabinoids, terpenes, and other compounds that contribute to the plant's unique effects, flavor, and aroma.

While biosynthesis is most prevalent in the growing and flowering stages of cannabis, there is evidence this process continues into the preliminary stages of curing.

Why You Shouldn't "Streamline" the Dry & Cure Processes

Some growers feel that a long and slow hang-dry accomplishes both drying and curing in the same process. Their common method is to hang dry for two weeks, often with fan leaves removed, at 60°F and 60% RH. While a good cure is possible, there are limitations to this practice.

First, while drying pulls most of the moisture from the plant, curing is a much more delicate process. It is often difficult to precisely maintain the conditions required to cure, particularly in dry regions where it is quite common to over-dry the flower. Curing in rooms rather than sealed containers also makes it more difficult to get the water activity to stabilize. Different thermal zones in the room also can make flower hung high dry at a different rate than flower hung on lower rungs. (When drying and curing in an open space, smaller chambers can give the most control during the curing stage.)

Secondly, a two-week hang-and-cure does not provide sufficient curing time for the flower. A standard, slow-and-cold dry will take 7 – 10 days, leaving only 4 – 7 days for curing. It is common to only experience the sweeter smell of well-cured cannabis between weeks 2 and 3 of curing.

How to measure water content in cannabis

There are three common metrics used to measure a cannabis bud's water content: Moisture Content, Relative Humidity, and Water Activity.

Moisture Content **Relative Humidity** **Water Activity**

Moisture Content

Moisture content refers to the amount of water, or moisture, that is present in a cannabis sample, typically expressed as a percentage of the sample's overall weight.

Measuring moisture content in cannabis is typically expressed as a percentage of the overall weight of the cannabis. An ideal range for cannabis moisture content is in the 10%-12% range. It is common to see moisture content in lab testing for potency in the 6% range. This is often due to samples being overdried (reducing their dry weight) to improve potency results. Some third-party labs also "correct" potency measurements to artificially eliminate that water content from the equation, further boosting the potency numbers.

Measuring moisture content has long been a common method of determining how much water is in a cannabis sample. This is typically done with a moisture meter–a small device with two probes that measure the electrical conductivity of the sample–and/or a moisture analyzer, a device that weighs the sample, heats it to a specific temperature, evaporates the water, and then measures the difference in weight once the water has been evaporated.

While a moisture meter is the most cost-effective solution, it is the least accurate way of determining the amount of water in cannabis. The readings will swing wildly based on the density of the flower and the pressure applied. It is quite easy to get readings that range from 8% to 13% with the same flower sample. For these reasons, the moisture meter is not a useful tool in cannabis outside of general checks.

Moisture Meter - ~$90

Moisture analyzers are commonly used in third-party laboratories during analytical testing. They are far more accurate than moisture meters at determining moisture content, however, they can be expensive compared to other methods of measuring moisture content. Additionally, moisture analyzers are designed to work with small samples, typically weighing a few grams. This can be a disadvantage if a larger sample size is required for accurate testing. These machines are also highly delicate, making them sensitive to user error and environmental conditions (e.g. temperature and humidity swings).

Their cost and sensitive nature often make moisture analyzers a poor tool for perfecting the cannabis curing process.

Relative Humidity (RH)

Relative humidity (RH) is a measure of the amount of water vapor in the air compared to the maximum amount of water vapor the air can hold at a given temperature.

Moisture Analyzer - ~$9,500

The most cost-effective method of measuring water activity is with a high-accuracy handheld electronic hygrometer. Most low-cost hygrometers (which typically retail for less than $50) will provide an accuracy range of +/- 4%, whereas a high-accuracy hygrometer (typically more than $150) will provide an accuracy range of +/- 2.5%. Some high-performance meters can be as accurate as +/- 1.5%. Some of these meters are stand-alone, while others integrate into a broader environmental control system.

It is important to use a high-accuracy hygrometer when measuring cannabis environments, especially dry and cure areas. It is also recommended to have two of these devices on hand to reference against each other. Devices in this price range typically do not have a calibration or sensor replacement option, so having a reference device provides some peace of mind.

Common hygrometers go out of calibration quickly.

Water Activity

Water activity (a_w) is a measure of the water vapor pressure in the cannabis sample compared to the vapor pressure of pure water at the same temperature and pressure. In simple terms, a_w is a measure of how much water is available for chemical and biological reactions to occur within a substance.

Water activity is an important parameter in the food industry and is becoming the cannabis industry's preferred method of measuring moisture content. It provides a more accurate indication of the amount of free water available in the cannabis sample, while other methods (e.g. moisture content) measure the total moisture content which includes both free water and bound water.

Free water (also referred to as available water) is the amount of moisture that is not bound to other molecules or surfaces. Free water is what feeds microbial growth and can reduce the cannabis batch's quality and safety. Water activity can also be a good indicator of degradation and shelf life.

Low-Cost Hygrometer
(Accuracy +/-5%): $25

Wireless Hygrometer
(Accuracy +/-4.5%): $80

High Accuracy Hygrometer
(RH accuracy +/- 2.5%): $290

Water Activity

Water activity is a unitless number that ranges from 0 to 1, with 1 indicating a completely saturated sample and 0 indicating a completely dry sample. As previously mentioned, an ideal a_w range for most dried cannabis is 0.60-0.62. The lower end of that range is the target for packaged cannabis.

There are various devices for measuring a_w, including capacitance meters. These devices measure the dielectric constant of the sample, which is related to the a_w. Capacitance meters use a sensor with two plates that create an electric field around the sample, and the capacitance is measured based on the amount of water in the sample.
Dew point meters measure the temperature at which the moisture in the sample condenses. The dew point is related to the a_w, and the measurement is taken by cooling the sample and measuring the temperature at which the moisture turns from gas to liquid.

> "Water activity can also be a good indicator of degradation and shelf life"

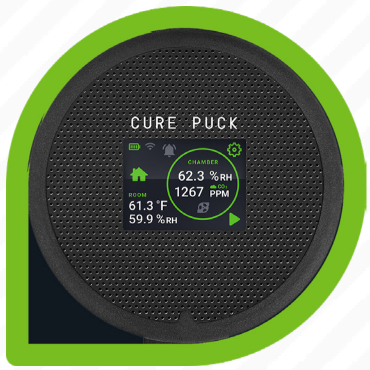
Electronic hygrometers use a humidity sensor to measure the relative humidity of the air above the sample. The a_w is then calculated based on the relative humidity and the temperature of the sample. Chilled mirror hygrometers, on the other hand, use a mirror that is cooled until dew forms on its surface. The measurement is taken by monitoring the temperature of the mirror.

The Cure Puck uses automated smart technology to help growers monitor the curing process. The Cure Puck uses high-accuracy sensors that measure key indicators such as water activity, vapor pressure, dew point, CO_2, temperature, and room environment within a 1% margin of error. Using that data, it automatically burps the container the perfect amount when required. It also provides alerts and control through a mobile app, such as remote burping or if the flower is at risk of microbial growth.

High Accuracy Water Activity Meter: $11,900

Portable Water Activity Meter (offshore): $745

Portable Water activity meter: $4500



Cure Puck - Automated Curing system

How to measure a_w

How to measure a_w with a hygrometer

Place the sample in a sealed container or bag to prevent moisture from escaping or entering the sample.

1. Place the sample in a container or bag (a nylon or turkey bag, or an equivalent) and insert the hygrometer probe into the headspace above the sample.
2. Seal the container or bag to prevent moisture from escaping or entering the sample
3. Allow the sample to equilibrate at room temperature (70°F / 21°C) for up to 24 hours to ensure the water in the sample is evenly distributed.*
4. Wait for the reading on the hygrometer to stabilize (this may take a few minutes).
5. Once the reading on the hygrometer has stabilized, record the relative humidity reading.
6. Calculate the water activity using the formula a_w= RH/100, where RH is the relative humidity reading in percent.

For example, if the hygrometer reads a relative humidity of 62%, the water activity can be calculated as:

$$a_w = 62/100 = 0.62$$

This means that the sample has a water activity of 0.62.

**Important Note: Cannabis that is too wet will climb past 65% quickly, often within 20 minutes (at 70°F / 21°C). It is not recommended to allow your sample to climb above 65% RH for an extended period, as microbials may begin to form. Growers can check their curing container after that time to make sure their batch doesn't exceed 65% RH.*

Creating a Stable Humidity Environment for RH Meter Calibration

It is quite common to have RH meters or hygrometers get decalibrated over time, especially when exposed to the varying conditions of a cannabis cultivation room. This is why it is important to verify that your meters are displaying an accurate reading, or else they could be giving you false information leading to costly mistakes.

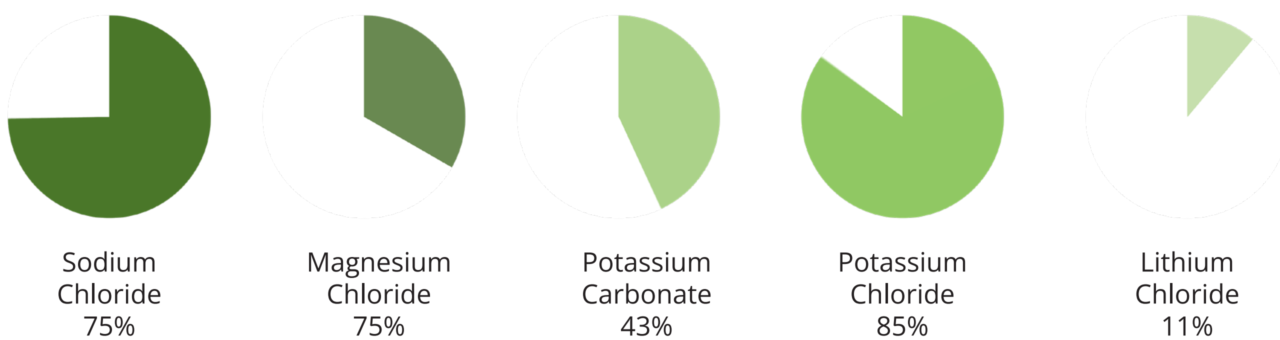
A common way to verify the RH meters are correct is to have a high-quality reference RH meter as the source of truth. When one meter does not match the others, it is an indication that the meter is out of calibration. However, The challenge with this is there is no way to determine which meter is correct. The only surefire way to ensure you can verify the calibration of your meter is to create a stable humid environment.

Creating a stable environment to verify or calibrate an RH meter can be done using a saturated salt solution method. There are pre-made kits available online for this purpose, or you can create your own.

Creating a saturated salt solution

The procedure involves creating a container with a saturated salt solution that produces a specific relative humidity at a specific temperature. Here are the general steps to create a stable humidity environment to verify or calibrate an RH meter used in cannabis cultivation:

1. Choose the salt solution: Select a salt that produces the desired humidity level at the calibration temperature. The table below shows some common salt solutions and their corresponding relative humidity at 25°C.



2. Prepare the container: Choose a container that is large enough to hold the salt solution and the RH meter. Place a layer of salt at the bottom of the container and add distilled water to saturate the salt. The salt should be wet but not floating in water.

3. Place the RH meter: Place the RH meter in the container, taking care that it does not touch the salt or the container walls. Seal the container with a lid or plastic wrap and allow it to equilibrate for at least 24 hours at the desired temperature.

4. Verify the humidity level: After 24 hours, verify the humidity level using a calibrated RH meter. The reading on the RH meter should match the expected humidity level based on the type of salt solution used.

5. Record the calibration: Record the calibration date, time, temperature, humidity level, and any other relevant information. This information should be kept for future reference.

Note that the specific procedure for creating an environment with stable humidity may vary depending on the type of salt solution used and the RH meter manufacturer's instructions.

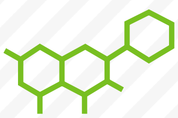
Having properly calibrated RH meters in all aspects of cannabis production, drying, and curing is essential to avoid costly mistakes.

Flavonoids

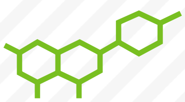
Flavonoids are a group of naturally occurring compounds found in various plants, including cannabis. They are responsible for providing pigmentation, filtering out UV rays, and protecting the plant from environmental stressors. In cannabis, flavonoids play a role in the overall taste, aroma, and color of the plant. They are not directly responsible for the psychoactive effects associated with cannabis consumption–these are primarily due to cannabinoids like tetrahydrocannabinol (THC) and cannabidiol (CBD).

Flavonoids At-A-Glance

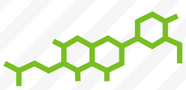
There are over 6,000 known flavonoids, but only about 20 have been identified in cannabis. Some of the most common flavonoids found in cannabis include:



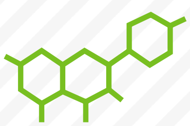
Quercetin: A common flavonoid with antioxidant and anti-inflammatory properties. It is also found in various fruits, vegetables, and grains.



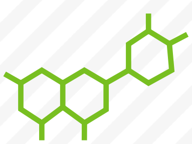
Apigenin: Known for its potential anti-anxiety, anti-cancer, and anti-inflammatory effects, apigenin is also found in plants like chamomile and parsley.



Cannflavin A & B: These are unique flavonoids found only in cannabis. They have been shown to have anti-inflammatory properties, potentially more potent than some over-the-counter anti-inflammatory drugs.



Kaempferol: A flavonoid with antioxidant, anti-cancer, and anti-inflammatory properties, kaempferol is also found in foods like apples, grapes, and green tea.



Luteolin: Known for its potential antioxidant and anti-inflammatory effects, luteolin is also found in plants like celery, thyme, and green peppers.

While research on flavonoids in cannabis is still in its early stages, studies suggest that they may have potential health benefits and could play a role in the entourage effect, which is the theory that various compounds in cannabis work together synergistically to produce greater effects than they would individually. Further research is still needed to fully understand the role of flavonoids in cannabis and their potential therapeutic applications.

Flavonoids in cannabis can be affected by the curing process in various ways. Flavonoids can undergo oxidation during the curing process, leading to changes in their chemical structure and properties. This can result in altered flavor, aroma, and color of the cured buds, as well as potential changes in their biological activities. High temperatures, excessive light, and prolonged exposure to air can all reduce the amount of flavonoids in the cannabis, reducing their presence in the final product.

By contrast, proper curing helps preserve flavonoids, which can be sensitive to heat, light, and air exposure. By maintaining optimal curing conditions (dark, cool, and stable RH), flavonoid degradation can be minimized.

Also, as flavonoids contribute to the overall taste and aroma of cannabis, a well-executed curing process can enhance the presence of flavonoids. This leads to a richer and more complex flavor profile in the final product, enhancing user experience (and retail value).

To maximize the preservation of flavonoids and other beneficial compounds, it is essential to properly cure cannabis. This involves maintaining an ideal temperature, humidity, and air exposure for up to 30 days. Monitoring and adjusting these conditions as needed can help protect the flavonoids and improve the overall quality of the final product.

Terpenes & Terpenoids

In the context of cannabis, the terms terpenes and terpenoids are often used interchangeably to refer to the complex mix of aromatic compounds that give the plant its distinctive aroma and flavor. However, chemically speaking, there is a subtle difference between the two.

Terpenes are the primary constituents of cannabis essential oils and are responsible for the plant's unique aroma and flavor. They are a large class of organic compounds that are made up of isoprene units and are typically volatile and aromatic. Terpenes often found in cannabis include myrcene, limonene, pinene, and linalool, among many others.

Terpenoids, on the other hand, are terpenes that have undergone some form of chemical modification, such as oxidation or rearrangement of the carbon skeleton. In the context of cannabis, this can refer to the various derivatives of terpenes, such as cannabinoids, which are derived from the terpene precursor geranyl pyrophosphate. Cannabinoids, such as THC and CBD, are not technically terpenes, but they are derived from the same metabolic pathway as terpenes.

This shift from terpenes into terpenoids is what is largely responsible for the pleasant changes in aroma during the cannabis curing process. The aroma can evolve from sharp and distinct notes into a diverse and sweet medley.

Anthocyanins

Both academic studies and hands-on experience have shown that exposure to cooler temperatures and changes in light cycles can increase the production of anthocyanins in cannabis plants. This can result in the development of purple or violet hues in the plant, which can be desirable for some growers and consumers.

Anthocyanins are not typically associated with cannabis curing. However, there is some evidence to suggest that the presence of anthocyanins in cannabis can be influenced by certain environmental factors and that this may have implications for the curing process.

In terms of the curing process, the presence of anthocyanins in cannabis could contribute to the overall flavor and aroma of the cured product. However, this is largely speculative and would depend on a variety of other factors, such as the genetics of the plant and the specific curing techniques used.

While anthocyanins are not a primary concern in cannabis curing, their presence may have some minor implications for the overall quality and appearance of the final product.

Troubleshooting

What causes bacterial and fungal growth?

Bacterial and fungal growth can take place on improperly dried and cured cannabis. Molds, which are fungi, are more common in cannabis than harmful bacterial growth, which is more common in food production.

Molds are decomposers, breaking down dead organic matter, and can grow when conditions are favorable (e.g., damp and warm environments). Some common types of molds include Aspergillus, Penicillium, Fusarium, Cladosporium, and Botrytis. Proper airflow can help to prevent the growth of harmful bacteria and fungi, which can compromise the quality and safety of the cannabis.

What causes the smell of cut grass in cannabis?

The distinctive smell of freshly cut grass in cannabis is primarily caused by the release of organic compounds called green leaf volatiles (GLVs) from damaged plant tissue. When fresh grass or cannabis is cut or damaged, enzymes within the plant cells break down fatty acids into smaller molecules, including GLVs, which are then released into the air.

GLVs are a diverse group of compounds, but the most abundant ones in cut grass are typically a mixture of six-carbon aldehydes, such as hexanal, and their corresponding alcohols and esters. These compounds have a strong and distinct odor that is often described as “grassy” or “herbaceous.”

The release of GLVs is thought to be a defense mechanism against herbivores and other potential threats to the plant. The strong odor of the compounds can serve as a warning to potential predators, and may also attract beneficial insects that help to defend the plant. The cut grass smell occurs primarily when trimming cannabis leaves that are still wet. Due to the volatile nature of these chemicals, the smell will typically dissipate and often disappear through the drying and curing process.

This smell can be avoided by trimming flower when the leaves are dry.

Why does my cured cannabis smell like cat pee?

The smell is caused by the presence of a compound called urea, which is produced when enzymes in the plant break down amino acids during the curing process.

Urea is also a component of urine, which is why the smell of improperly cured cannabis can resemble cat urine. When cannabis is exposed to elevated temperatures or excessive moisture during the curing process, the breakdown of amino acids into urea can occur.

Keep the curing environment cool and dry, and make sure you burp your containers at the proper intervals to release gas buildup.

Does curing cannabis well produce white ash?

Many believe that white ash is a sign of quality cannabis, although there is little scientific evidence supporting that connection. The tobacco industry spent considerable effort to achieve white ash when the same perception was dominant there.

While properly curing cannabis will not guarantee white ash, the following items are influenced by a good cure do play a role in creating white ash.

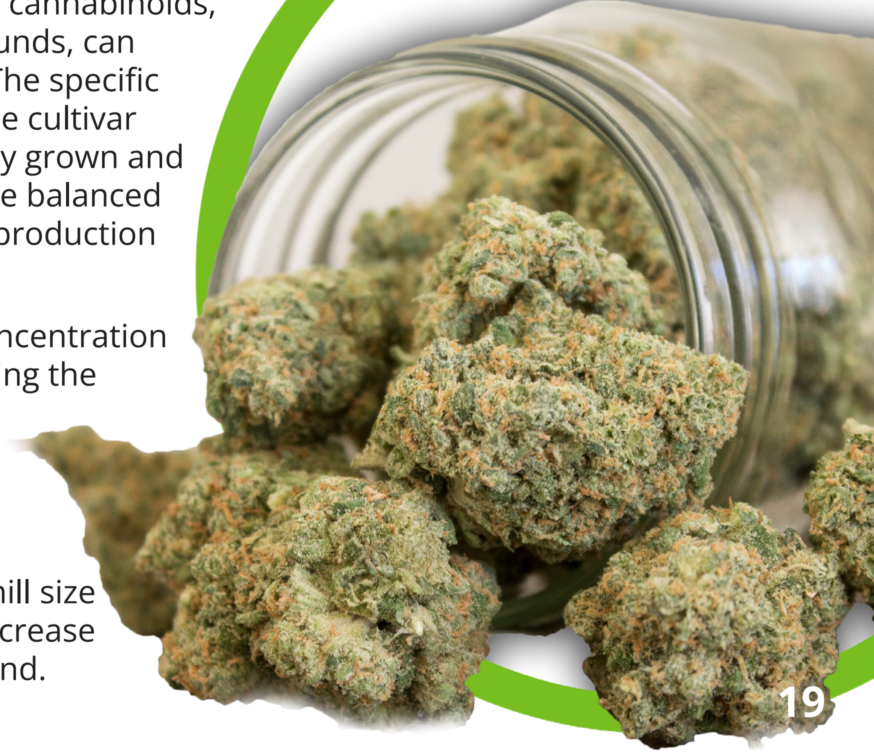
Complete combustion: The quality of the cure affects the moisture content in cannabis. Properly cured cannabis has a balanced moisture level that allows for even and complete combustion when burned. Complete combustion of organic material results in the production of lighter-colored ash, which is often white or light gray. This can also be observed when burning wood in a campfire – wet wood produces dark ash, and the same wood that is very dry will produce lighter-colored ash.

Combustion efficiency: The curing process affects the combustion efficiency of the cannabis. Well-cured cannabis burns more completely, efficiently, and ultimately hotter, leading to the formation of lighter-colored ash. Specific elements in cannabis (such as nitrogen) must reach a specific temperature to burn effectively. This can be noticed when black ash is heated with a torch at an extremely hot temperature, turning that ash gray.

Plant material composition: The chemical composition of the flower, including cannabinoids, terpenes, and other organic compounds, can also influence the color of the ash. The specific composition varies depending on the cultivar and growing conditions, but properly grown and cured cannabis tends to have a more balanced composition, which can lead to the production of lighter-colored ash.

Chlorophyll Breakdown: A high concentration of chlorophyll affects ash color. During the curing process, chlorophyll and other pigments within the cannabis plant begin to break down. This can contribute to lighter-colored ash.

Other key factors such as grind or mill size and type of rolling paper can also increase the odds of leaving a white ash behind.



What substances are effected by enzymes and water activity?

1. **Chlorophyll**: Chlorophyllase catalyzes the hydrolysis of chlorophyll to produce chlorophyllide and phytol.

2. **Proteins:** Proteases, for instance, are enzymes that break down proteins. Their activity can be affected by the hydration levels determined by a_w.

3. **Starches:** Amylases are enzymes that break down starch. Water activity can influence the efficiency of this breakdown.

4. **Lipids:** Lipases, enzymes that hydrolyze fats, can have their activity modulated by a_w.

5. **Pectin:** Pectinases, which break down pectin during fruit juice extraction and other processes, can be influenced by varying water activity.

6. **Cellulose:** Cellulases, which break down cellulose, can be affected by water activity levels.

Conclusion

In the intricate world of cannabis curing, science meets artistry. By grasping the significance of water activity, selecting the right curing method, and measuring water activity with precision, you can elevate your cannabis to a realm of unparalleled quality. With patience and dedication, you can truly master the art and science of cannabis curing, delivering an exceptional cannabis experience like no other.

Have more questions?

Reach us at consultation@twistertech.io