



eBook

The Science of Cannabis Odors and Plant-Based Odor Removers



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INTRODUCTION

As legal marijuana sales continues to explode (it's estimated to quadruple in the U.S. between 2016 and 2021), **growers face mounting challenges** along with enticing profits. Odor complaints from cannabis have jumped in some areas by as much as 87% since growing became legal. In Denver alone, *30% of all municipal odor complaints are now cannabis-related.*

Local governments and clean air agencies are starting to enact laws and issue fines — in the tens of thousands of dollars — to limit odors. Many odor control solutions require complex engineering, expensive permitting, or costly equipment. One option that is gaining interest is plant-based odor removers, a **cost-effective and more earth-friendly way** to get rid of cannabis smells.



It is imperative for cannabis growers to understand the odors produced during cultivation and safely control them to maintain the quality of life for their neighbors and themselves.

DR. LAURA HAUPERT

Director of Research and Development at OMI Industries,
the leader in plant-based odor removing products.

SCIENCE OF CANNABIS ODOR SOURCES








The strong odors produced by growing cannabis are often described as *pungent, skunky, floral, fruity*, or even “sewer-like.” Created by the plant’s essential oils (terpenes), odors are strongest when the flower is budding. Some odors from cannabis farms have been detected more than a mile from their source.








Cannabis odor is a complex mixture of chemicals. The “scent” usually comes from the **terpenoids** and **terpenes** that it contains. Terpenoids can be further classified into monoterpenoids, sesquiterpenoids, diterpenoids, and triterpenoids. They can be acyclic, monocyclic, or polycyclic hydrocarbons that may have substitutions on them including alcohols, aldehydes, ethers, ketones, and esters. A mixture of general hydrocarbons also play a role in the odor.

The concentration and combination of odorous chemicals **vary from greenhouse to greenhouse**. Hundreds of different strains of cannabis can be grown, each with a *unique scent profile*. Over 200 individual compounds have been identified as terpenoids, making the chemical makeup of odors complex.

Because smells and their chemistry can vary, it can be difficult to find an odor solution that works for every grower and every facility.

Common Cannabis Terpenes

							
Terpene	Limonene	Pinene	Myrcene	Linalool	Caryophyllene	Terpinolene	Camphene
Aroma	Citrus, Lemon	Pine, Fir	Musky, Earthy, Cloves	Floral, Lavender	Spices, Black Pepper, Wood	Pine, Herbs	Damp Woods

							
Terpene	Terpineol	Phellandrene	Carene	Humulene	Pulegone	Sabinene	Geraniol
Aroma	Lilac, Flower Blossoms	Peppermint, Citrus	Sweet, Pungent (Fir)	Hops, Beer	Peppermint	Pine, Orange, Spices	Rose

[Source 1](#), [Source 2](#)

COMMON CANNABIS CULTIVATION ODOR CONTROL TECHNIQUES

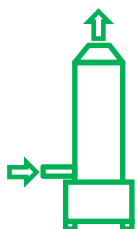
There are several commonly used techniques currently in place to remove odors in cannabis growing facilities. While there are viable options, each come with a variety of limitations and their own shortcomings.



Most cannabis greenhouses use **carbon filters** to remove odors permeating from the facility. Activated carbon works by the contaminated air stream passing through the activated carbon. Carbon is porous, has a large surface area, which allows the carbon to absorb the odorous chemicals in the air stream.

CONS

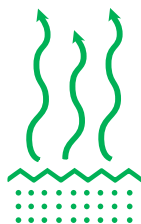
Activated **carbon filters** work well on sulfur-containing compounds, but it is not as effective at treating nitrogen-based compounds. They also must be replaced about every year, which can be costly and time consuming in larger facilities. Also, carbon filters reduce airflow through greenhouse fans. Since airflow is so important to growing, additional fans are sometimes needed.



Wet scrubbers treat contaminated air by pumping it into an aqueous solution before it escapes outside. The odorous compounds go into the liquid and chemically react with the solution, removing odors. If mercaptans or ammonia is present in the air, a multi-stage scrubber is sometimes used.

CONS

Scrubbers can be expensive to build and must be operated by trained personnel and serviced in protective gear. The complex setups are designed for a specific application and have to include careful considerations for dangerous exhaust gas. Also, the chemicals used are considered reactive, hazardous, and must be neutralized before disposal.



In **Biofiltration**, contaminated air passes through soil, compost, wood chips, or other organic material. As the odorous air flows through the material, pollutants (including odor molecules) transfer into a thin biofilm on its surface. Microorganisms are immobilized in the biofilm and eliminate odors.

CONS

Biofiltration works on odors that are both biodegradable and water-soluble, including hydrogen sulfide and other sulfur-containing compounds. They do not work effectively on chemicals containing nitrogen. In order for the microbes to interact with the odorous compounds, they must be present in them for long periods. To scrub large amounts of odorous air, a sizable amount of material and a massive -footprint are often needed.



Masking agents are chemicals sprayed into the air to cover up produced odors. Masking agents use fragrances to “hide” odors and are used outside greenhouse facilities so they do not impact the taste or smell of actual cannabis plants. They often work by adhering to the outside of odor molecules.

CONS

While **masking agents** give an immediate cover to odors, they will eventually return. After a short period, the fragrance and odor molecules separate, leaving the odor behind.

Other odor control challenges include:

- Most municipalities now restrict how commercial cannabis grow operations handle odors.
- Large-scale ventilation systems that pump untreated air outdoors can be prohibited in some urban areas.
- Industrial filtration systems can be costly to install, operate and maintain.
- Some odor solutions require the use of water to distribute, adding additional costs and equipment (especially in areas of water conservation).
- Multiple partners are often needed for equipment, materials, setup, and maintenance.

USING PLANT POWER TO FIGHT PLANT ODOR

Plant-based odor removers use natural plant oils to destroy cannabis smells. The blend of plant oils attract odor molecules, and use adsorption and absorption reactions to neutralize their offensive scents. These liquid products are distributed by systems placed where exhaust exits a growing facility, eliminating odors before they become a nuisance to neighbors.

There's a saying in chemistry that "like dissolves like." A more common version of this saying is "**fighting fire with fire.**" Natural odor removers use plant oils to neutralize plant odors.

As an example, alpha-pinene is a volatile organic compound (VOC) that is a terpene — an odor-causing compound in cannabis. Alpha-pinene is in other plants, including Pine, Rosemary, Frankincense, Cypress, Juniper Berry, and Orange. Some of these oils are effective at attracting and neutralizing odor molecules from cannabis, because of their similar chemical makeup.

Using this knowledge, natural odor removers can be specifically designed to eliminate the odorous chemical compounds in cannabis — including cannabinoids, terpenes, and sesquiterpenes. Since a blend can be engineered for broad-spectrum odor control (it can remove a larger range of odorous compounds), it works better and more universally than other methods.

Plant-based odor removers **do not contain harsh chemicals or synthetic fragrances**. Because they are non-toxic, non-hazardous, biodegradable, non-flammable, and contain no harmful VOCs, they are safe to use around people and require no permits to use. Delivery often needs no added water, thanks to advanced Vapor Phase technology, making it cost effective and more eco-friendly. And they are used outside greenhouses so they do not come into contact or alter the plant itself.

Science of Plant-Based Odor Removers



Contact

Ecosorb is delivered into an area affected by odors and attracts to odor molecules.



Adsorption

Ecosorb attaches to odor molecules.



Absorption

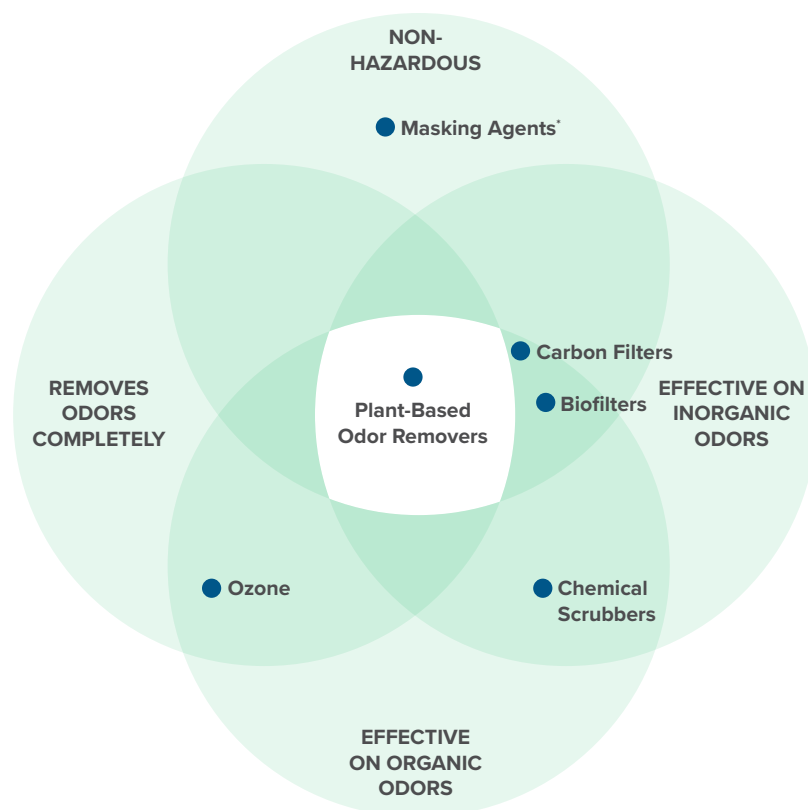
Ecosorb surrounds odor molecules, neutralizing their smell.

COMPARISON OF COMMON ODOR CONTROL TECHNIQUES

Odor Solution Method Comparisons

	Plant-Based Odor Removers	Masking Agents	Adsorption (Carbon Filters)	Ozone	Bio-Filtration
Uses Natural Ingredients	X		X		X
Non-Hazardous	X		X		X
Safe for the Environment	X	?	X		X
Simple Setup and Use	X	X			
Removes Odors Completely	X			X	
Effective on Organic Odors	X		X	X	X
Effective on Inorganic Odors	X		X		X
Cost-Effective (Implementation)	X	X			
Cost-Effective (Maintenance)	X	X			

*Masking agents that use fragrances have been proven to include harmful ingredients. In University of Washington research of common air fresheners, they found on average 17 chemicals in each product — nearly a quarter which would be classified as toxic or harmful. [Source](#)



*Masking agents that use synthetic fragrances have been know to use harmful ingredients

HOW TO USE PLANT-BASED ODOR REMOVERS

Most products come in concentrated liquid. They can be delivered through misting systems at exhaust vents, vapor ducting at the top, or other areas of a greenhouse. Another advantage of natural odor removers is their flexibility. Complete solutions can be customized to every facility to combat any odor issue.

Other options include:

- Distribution equipment placed indoors or outside (weatherproofed for any climate)
- Modular systems for individual greenhouses
- Master, centralized systems for multiple growing areas
- Automated controls that regulate dispersion
- Integrated controls with existing systems

ECOSORB CNB 100: FORMULATED FOR CANNABIODOR CONTROL

Ecosorb® CNB 100 by OMI Industries is a natural odor remover designed for the control of cannabis plant odors. Our blend of purified water, surfactant, and natural plant oils eliminates odor-causing chemical compounds in cannabis — including cannabinoids, terpenes and sesquiterpenes.

Ecosorb products do not contain harsh chemicals or synthetic fragrances. They do not mask odors and are safe for use around people and animals. The distribution of Ecosorb requires no added water, thanks to advanced Vapor Phase technology.

For over 25+ years, Ecosorb has been the trusted solution for organic and inorganic odor removal in many industries. Companies in asphalt production, wastewater treatment, composting and food processing have trusted our products and proven them effective.



Effective

Verifiably, scientifically proven to work.



Natural

Ecosorb uses the natural power of plant oils to remove odors, meaning no permits required.



Safe

Non-toxic, non-hazardous, biodegradable, non-flammable, and no harmful VOCs.

CASE STUDY: ECOSORB CNB100 IN ACTION TO FIGHT PLANT ODOR

Challenge

A marijuana growing operation in the Midwest saw high odor emission from their facility. Neighbors in the surrounding area began to take issue with the odor — a challenge the facility needed to solve quickly.

In the spirit of being a good neighbor, the cannabis operation tested dozens of products to cut down the distinct, potent smell. After six months of trial-and-error, the operation turned to OMI Industries.

Solution

To solve their odor issues, OMI immediately recommended their Ecosorb CNB100 product. CNB100 was designed specifically for the cannabis growing industry and related odors, making it a perfect solution for the operation.

“CNB100 was designed specifically for cannabis production,” said Steve Lattis, Operations Director, OMI Industries. “Each growing operation in this industry is unique, so we created a broad-spectrum odor remover to fit the needs of each grower and facility.”

Ecosorb CNB100 can be used as constituted or diluted with water, based on delivery method. At this cannabis facility, the product is being diluted 300:1 and then atomized through a high-pressure atomization system — eliminating odor before it becomes a nuisance to neighbors.

Result

After trying many products, the cannabis facility finally got the proper odor control they needed with CNB100. With the odor no longer a nuisance to their neighbors, they can now focus on production, like any growing operation should.

“Whatever industry we operate in, our goal is to eliminate issues with production and reduce its effect in the area,” said Lattis. “When cannabis growers have the ability to reduce the effect of their operation, they eliminate preventable issues with their production.”



ABOUT OMI INDUSTRIES

Ecosorb® by OMI Industries is the leader for **natural, safe, effective, and complete** plant-based odor solutions for any industry — including cannabis growing. They don't mask smells, they get rid of them for good by breaking down and neutralizing odor molecules. Each product includes plant-based ingredients that are safe for the public — neighbors, employees, communities — animals, and the planet.

For almost 30 years, Ecosorb has used simple science to harness the power of plants as natural odor removers. Our proprietary blend of plant oils tackle the toughest smells **without dangerous side effects**. Ecosorb® is strong enough to battle the worst odors — from landfills to refineries to wastewater treatment facilities — yet **safe for people and the environment**.

Our Process

Implementing an Ecosorb solution is **less complicated than other common odor control methods**. Our experienced team partners with each customer to create a complete control plan based on specific odor issues.



Design

Using our years of expertise in odor control, we match your odor problem to an existing Ecosorb blend. In some cases, a custom formula is needed to battle unique odor combinations, like those found in cannabis grows of different strains. Chemists at OMI Industries can determine the best mix of ingredients for each odor issue.



Build

We manufacture, engineer and customize equipment to deliver Ecosorb, based on each application and its environment — weather, delivery method, output volume, and more.



Outfit

Ecosorb delivery systems fully integrate with your existing equipment and processes. Our engineers work with your team to install and maintain a complete odor solution.

Get Started

To learn more about Ecosorb solutions and equipment, visit EcosorbIndustrial.com or contact us at 800-662-6367.