ClorDiSys

Application Note #68

Cannabis Decontamination Method Comparison

The cannabis decontamination process is in place to ensure that products meet a certain level of safety and quality. Cannabis decontamination is a series of intentional steps taken to reduce the level of common contaminants present in cannabis such as microbes, heavy metals, and pesticides. Legalized cannabis use means that companies have to ensure that their products go through different types of quality tests. A decontamination process is considered successful if the cannabis products pass the contaminants tests. Passing state regulations for microbial contamination can be challenging. In fact, previously 'passed' batches of available-to-consumer flower have turned out to have harmful bacteria levels after sitting on the store shelf. Excessive levels of mold, yeast, and bacteria can cause health problems for consumers. Like with produce, some antimicrobial treatments may themselves be harmful to the health of consumers and the integrity of the product itself. However, that being said, there are ways for microbial contamination to be remediated without damaging the final product.

Autoclave

An autoclave system uses heat and pressure to kill microbes. They are available in different brands, configurations and sizes. This is an easy-to-use option, but it is time consuming. However, because it utilizes moisture, it does increase the risk of mold infestation. The final product may experience a change in color, taste and smell.

Dry Heat

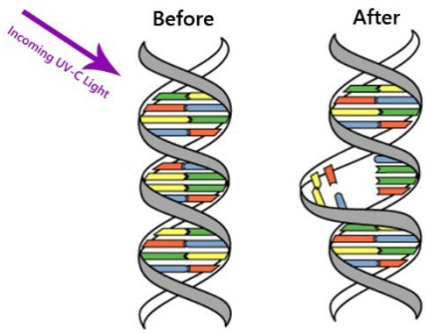
Placing cannabis in dry heat is one of the cheapest methods, and it does not have any mold or yeast infestation issues. It is important to note that this method would most likely ruin product unless you plan to extract it.

X-Ray

X-ray is a highly effective form of high-energy electromagnetic radiation. X-ray wavelengths are shorter than those of ultraviolet (UV) radiation. The cannabis is placed in a lead-lined chamber that ensures the safety of the operator during the decontamination process. X-rays are produced from an internal vacuum tube once the lead lined chamber

is sealed. The X-rays penetrate the cannabis and kill the microbes. What you are decontaminating is limited to the size of the chamber.

Ultraviolet Light



Ultraviolet light is a completely chemical-free way to combat molds and bacteria that plague cannabis plants. UV-C is energy from light that has been used to inactivate DNA-based contaminants since the 1850's. With UV-C technology, there is no residual left behind as there are no chemicals involved. The cannabis product is not altered by the exposure to UV light. Any exposed surface contamination, such as molds, bacteria, and viruses, are significantly reduced, if not eliminated entirely. While a quick and easy method, UV-C intensity does drop off with distance, so it is difficult to scale up.

Gamma Radiation

Gamma irradiation involves exposing the target material to packets of light (photons) that are so highly energetic (gamma rays) that they damage the DNA strands present. It reduces microbial growth in plants without affecting potency. However, it uses ionizing radiation that can create new chemical compounds not present before, some of which can be cancer-causing.

Radiofrequency

Radiofrequency, or RF, uses radio waves to make water molecules within the product vibrate and generate heat to kill microbes similar to how a microwave oven works. However, because it is dependent on moisture, microbes in dry areas of the flower are not effectively remediated, meaning dangerous microorganisms in these areas can continue to grow and spread even after the product has passed testing measures. Radiofrequency may also cause burns on the product, along with potential negative effects to potency, look, smell and taste.

Ozone

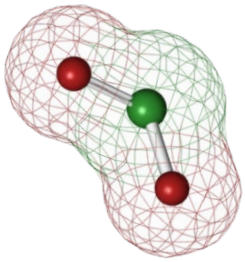
Ozone gas (O3) is a highly reactive oxidizing molecule that destroys the microbes' cell wall, which enables the ozone to destroy all of the cell's components: enzymes, proteins, DNA, and RNA. It is a true gas which readily distributes. This method greatly reduces the number of microbes but does not reduce the number to

zero necessarily, because it breaks down quickly. Ozone at too high of levels, or levels that are not properly controlled, is dangerous to cannabis plants. At too low of levels, it really doesn't have much of an effect at all.

Hydrogen Peroxide

Hydrogen peroxide can be applied directly to the product, environment, and supplies through spray, fogger, or submersion to kill microbial life. A mild dilution of hydrogen peroxide and water is also an incredible insect repellent. Hydrogen peroxide may oxidize the surface of the flower which can alter the look, smell, taste and potency of the product. Also, vapors can condense, and the resulting moisture can cause more mold spores to germinate.

Chlorine Dioxide Gas



For a complete kill of all potential organisms, EPA-registered chlorine dioxide gas is the optimal way to fill an entire space evenly and completely, decontaminating every surface, crack, or crevice with no residues or additional cleanup. This treatment can be performed either in an enclosed chamber or easily scaled up to rooms, even entire facilities, if there is a widespread outbreak. As an oxidizer, at high use levels, chlorine dioxide gas can alter the look and taste of the product.

The process of cannabis cultivation, storage, and distribution exposes cannabis to different types of contaminants including microbes, heavy metals, and pesticides. Microbial growth is enhanced or reduced by environmental conditions. Moldy bud is the common enemy and the primary concern, but not all remediation is created equally. Remember optimal decontamination of the environment, plants, and supplies is the secret to the best quality and safety.

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