



Cannabis Irradiation 101

By: Clean Cannabis Research LLC
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Warning: Cannabis products are not for use by anyone under the age of 21. Cannabis use may cause drowsiness, affect focus, reaction time, and decision-making. These products are not evaluated or approved by the FDA. Pregnant people should avoid cannabis due to the risk of low birth weight, premature birth, stillbirth, and harm to fetal brain development.

What Is Cannabis Irradiation?

- Irradiation is the process of exposing cannabis to ionizing radiation (like X-rays) to kill harmful microbes, bacteria, mold, and fungi.
- Irradiation is typically performed using specialized equipment. For example, Clean Cannabis Research LLC uses the SteriRad Decontamination System.



Irradiation Is Standard In Other Legal Cannabis Markets

Medical cannabis can't be sold within the Netherlands until the country's Ministry of Health certifies the product as irradiated.

All medical cannabis imported into Germany must be irradiated in a laboratory that is compliant with that country's strict requirements.

Canadian cannabis producers routinely irradiate an estimated 80%-90% of their product, and the Canadian Société Québécoise Du Cannabis published an article in 2026 explaining that: "Contrary to popular belief, regulated irradiation does not degrade cannabis quality. Instead, it reduces the risk of contamination for both products and consumers."

Large U.S. cultivators such as EOS Farms and Curaleaf have reported regularly using irradiation to satisfy regulatory testing standards.

When Is Cannabis Irradiated in Minnesota?

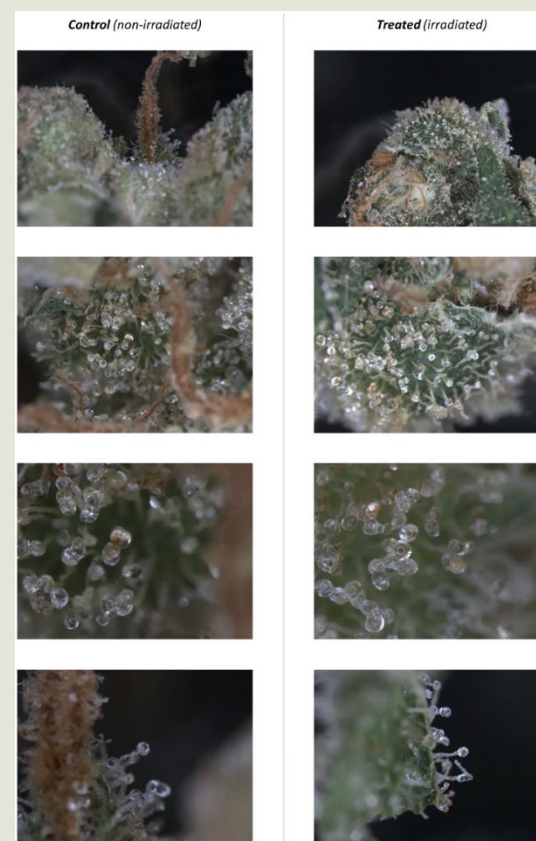
A significant amount of cannabis in Minnesota is irradiated only *after* it fails testing for microbial contamination.

Minnesota has strict requirements for the levels of allowable microbes in cannabis test samples. For example, detection of any amount of aspergillus—a common airborne mold spore found outdoors in Minnesota—is grounds for failure.

After the cannabis fails testing for microbial contamination, the OCM requires that the cultivator submit a remediation plan explaining how the batch will be remediated, and irradiation is one effective remediation method accepted by OCM.

Peer-Reviewed Research Confirms That Irradiation Does Not Degrade Cannabis

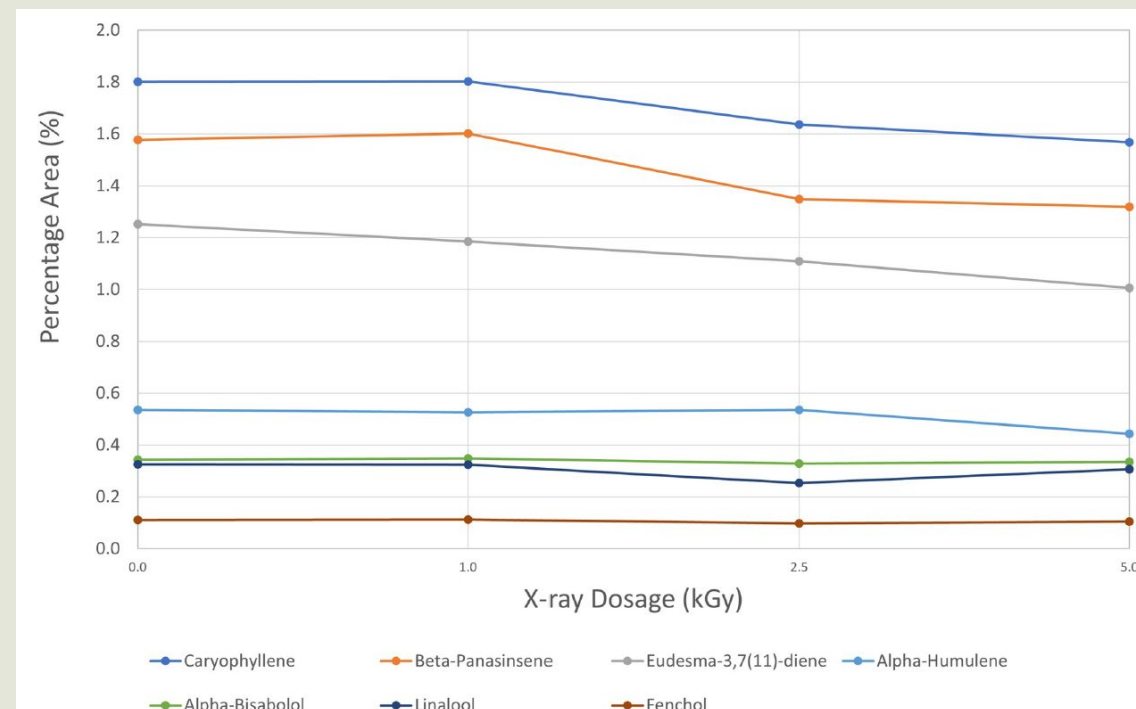
- A study which compared the cannabinoid and terpene percentages of irradiated and non-irradiated cannabis was published by researchers in the Netherlands in 2016.
- The researchers concluded that the treatment did not change cannabinoid content (THC, CBD, etc.) in cannabis. Likewise, moisture content and the microscopic structure of dried cannabis flowers were not altered by the standard irradiation protocol. The effect of irradiation was limited to a minimal reduction of certain terpenes, and this loss was comparable to the normal evaporation observed after harvest and storage.
- Citation: Hazekamp A (2016) Evaluating the Effects of Gamma-Irradiation for Decontamination of Medicinal Cannabis. *Front. Pharmacol.* 7:108. doi: 10.3389/fphar.2016.00108



Peer-Reviewed Research Confirms That Irradiation Does Not Degrade Cannabis

- In 2022, another study which compared the cannabinoid and terpene percentages of irradiated and non-irradiated cannabis was published by researchers in the United States.
- The researchers concluded: “X-ray treatment of cannabis flower did not significantly alter the cannabinoid or the terpene profiles of the flower samples.”
- Frink S, Marjanovic O, Tran P, Wang Y, Guo W, Encarnacion N, Alcantara D, Moezzi B, Vrdoljak G. Use of X-ray irradiation for inactivation of *Aspergillus* in cannabis flower. PLoS One. 2022 Nov 15;17(11):e0277649. doi: 10.1371/journal.pone.0277649. PMID: 36378669; PMCID: PMC9665375

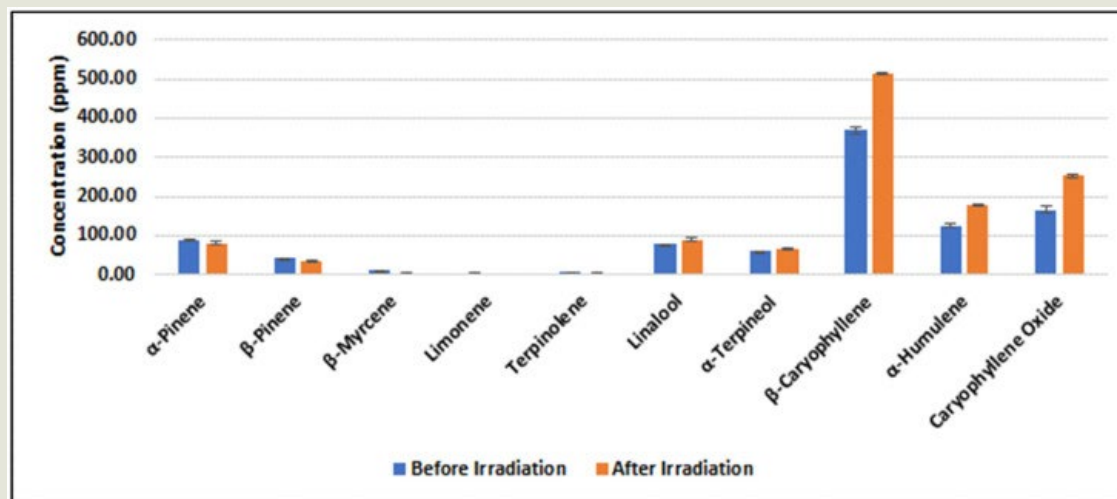
Flower terpene concentrations at various doses:



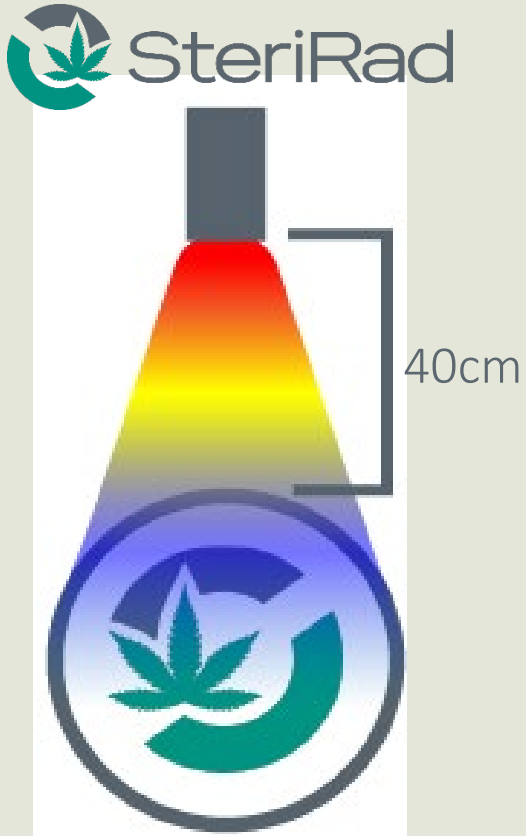
Peer-Reviewed Research Confirms That Irradiation Does Not Degrade Cannabis

- In 2023, another study which compared the cannabinoid and terpene percentages of irradiated and non-irradiated cannabis was published by researchers in the United States.
- The researchers concluded: “irradiation has no effect on the cannabinoids and little effect on terpenes and moisture content, but it did result in the virtual sterilization of the plant material, as evidenced by the low levels of bacterial and fungal colony-forming units (CFUs) < 10 after gamma irradiation.”
- Majumdar CG, ElSohly MA, Ibrahim EA, Elhendawy MA, Stanford D, Chandra S, Wanas AS, Radwan MM. Effect of Gamma Irradiation on Cannabinoid, Terpene, and Moisture Content of Cannabis Biomass. *Molecules*. 2023 Nov 22;28(23):7710. doi: 10.3390/molecules28237710. PMID: 38067441; PMCID: PMC10707833.

Comparative flower terpene concentrations:

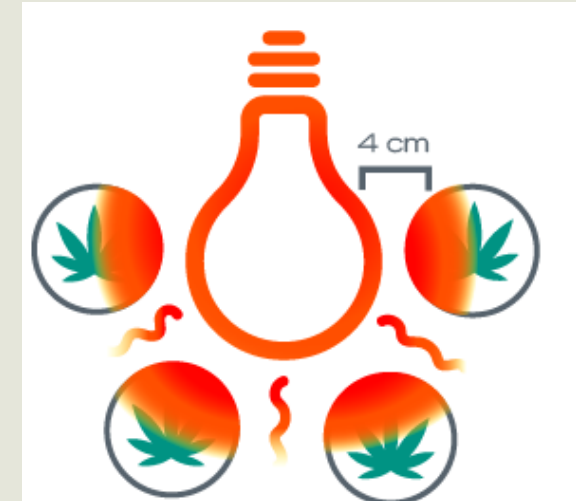


How Does Clean Cannabis Research Irradiate Cannabis?



- ***Clean Cannabis Research uses a method that has less impact on terpenes than the Danish study:***
 - Clean Cannabis Research uses the SteriRad Decontamination System.
 - SteriRad is unique because of the distance between the X-ray tube and the cannabis being treated: 40cm apart, while traditional machines are 4cm apart.

Traditional X-Ray



How Does Clean Cannabis Research Irradiate Cannabis?

- ***Clean Cannabis Research uses only the exact amount of X-ray treatment needed to decontaminate:***
 - By harnessing information about known contaminants, Clean Cannabis tailors its treatment to be the least amount of X-ray that will be effective in removing the contamination, further reducing any potential impact on the product.

The screenshot shows the SteriRad Precision TouchRad interface for selecting a cannabis irradiation program. The title is "Cannabis Program Selector". It features a table with columns for Microbe, Current Level, State Maximum, and Target Level. To the right of the table are dropdown menus for volume and weight, and a description field. At the bottom are two buttons: "Create New" and "Run Existing", both with green checkmark icons.

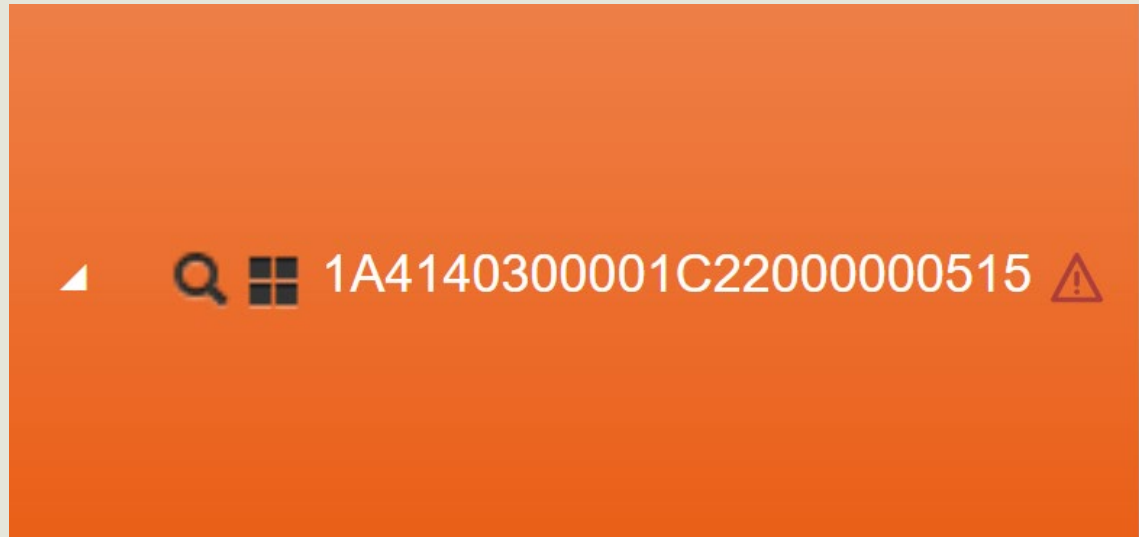
Microbe	Current Level	State Maximum	Target Level
TY&M	30000	10000	3000
Aerobic Bacteria	13000	100000	1300
Gram Neg Bacteria	12000	1000	1200
Coliform	6000	2000	200
E-coli	4000	2000	200
Salmonella	10	0	0
Aspergillus	10	0	0

10 Gallon ▼
10.5 lb ▼
Description
651 Gy (4.0 Hrs)

Create New Run Existing

What Is Remediated Cannabis?

- Remediated cannabis is product that has:
 1. Failed testing;
 2. Then been treated (for example by CCR's irradiation);
 3. And then passed when retested.
- Although it contains a warning symbol, ***remediated cannabis*** is product that ***has been specifically treated and cleared of any contaminants***.



Cannabis Remediated by Clean Cannabis Research Is Safe and Pristine

- By harnessing the advanced technology of the SteriRad, Clean Cannabis Research effectively irradiates cannabis with no significant effects, including on moisture, cannabinoids, or terpenes.
- Clean Cannabis Research partners with stayLIT LLC for transportation and distribution of remediated product across the entire state of MN.

