PIPP HORTICULTURE

NAVIGATING CULTIVATION ROOM DESIGN

OPTIMIZATION VS MAXIMIZATION

FREQUENTLY ASKED QUESTIONS

Elevate. Cultivate. Grow.®

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THE **BACKSTORY**

The legalization and commercialization of cannabis have sparked a revolution in cultivation practices. With this evolution comes the critical question: should cultivators design facilities that **optimize resources** for efficiency and quality, or should they push boundaries to **maximize output**?

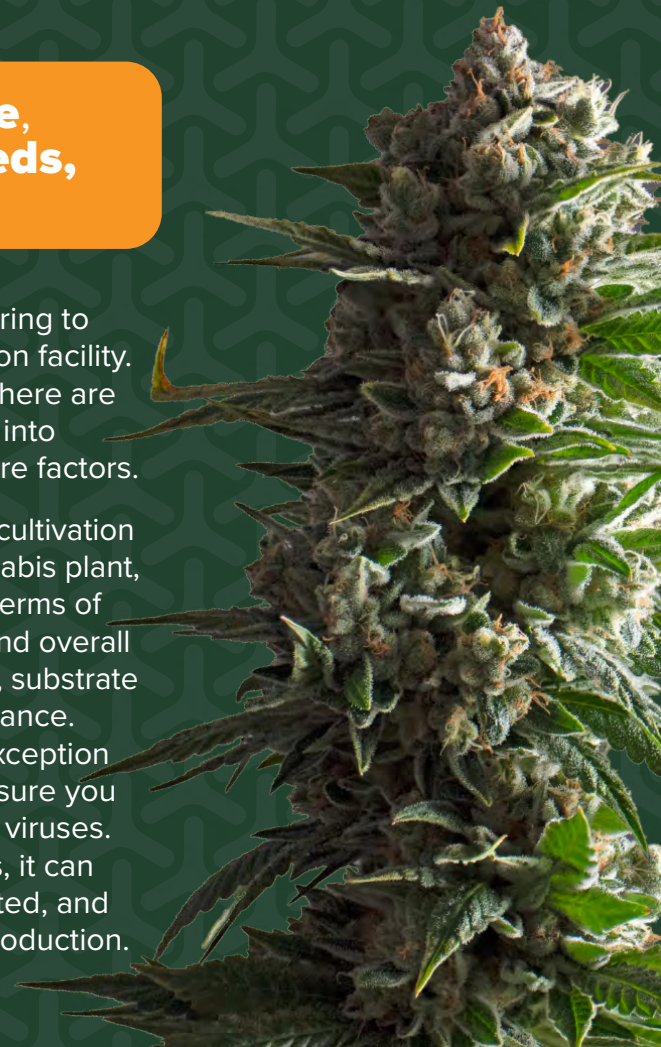
In our **recent webinar**, we tackled this debate between optimization and maximization in cannabis cultivation design. We discussed the intricacies of both approaches, dissecting the pros and cons to provide a comprehensive understanding for cultivators, entrepreneurs, and executives alike.

At the end of the webinar, we held a **Q&A** with the viewers to answer any questions they had. We then took those conversations and turned them into an eBook to share those great discussions and frequently asked questions with you!

#1 When going the **optimized route**, is it better to go with **clones, seeds, or tissue culture?**

Optimization referenced during the webinar was mostly referring to **design, airflow, and workflow** in an indoor multi-tier cultivation facility. When comparing working from clone, seed, or tissue culture, there are advantages and disadvantages for each. Growers must take it into consideration many other external, regulatory, and infrastructure factors.

Clones are one of the most common approaches for starting a cultivation facility. Clones are genetically identical copies of a mother cannabis plant, so you more or less have a general sense of what to expect in terms of the cultivar's cannabinoid and terpene profile, plant structure, and overall performance. Mind you, how growers manage the environment, substrate selection, and irrigation strategy can manipulate plant performance. Clones also allow for the **fastest speed to market** (with the exception of auto-flower seeds) of the three options. It is important to ensure you are sourcing clean clones that are free of pests, diseases, and viruses. If the mother or stock plant has pests, diseases, and/or viruses, it can be spread through clones. All clones should be inspected, tested, and quarantined before being introduced to craft or commercial production.



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There are three major types of cannabis seeds, which are **regular, feminized, and auto-flower.** Regular seeds can germinate into male or female plants. Feminized seeds are modified so that they are incapable of creating male chromosomes, growing only the female plants. Auto-flower seeds or day-neutral seeds automatically switch from vegetative growth to the flowering stage based on age, as opposed to the ratio of light to dark hours required with **photoperiod-dependent cultivars**. Seeds are typically free of any pests, but viruses can be spread through seeds if the parental lineage plants used to create the seeds are infected.

Plant tissue culture (PTC) is a collection of techniques used to grow plant cells, tissues, organs, or seeds in a sterile environment on a nutrient medium. The **sterilization stage** in tissue culture cultivation can be particularly effective in eliminating diseases and viruses, making it stand out when compared to starting from clone or seed. PTC propagation can result in **faster maturity times** compared to growing from seed, which enables growers to use space more efficiently without overcrowding grow rooms. However, the key advantage of tissue culture is the **sterile environment**, which can eliminate diseases and provide a clean environment for plants to thrive.

Most cannabis operators who utilize PTC are creating **clean stock mothers** and then taking cuttings through traditional cloning techniques for production. Because of the equipment involved, chemicals needed, and tools required, setting up a cannabis lab becomes an **expensive process**. Thus, it limits many low-budget researchers and growers to work with the technology. PTC is new to the cannabis industry, and not everything has been figured out so far, like the kind of work that has been done with other plants in the area. Thus, it will require a lot more time to get a **working protocol** or workflow that will enable growers to produce healthy, stable, and reliable genetics without much loss.

#2 To be optimized, do we really need **rolling tables**, or can they be **stationary?**

Good question! In most rooms with mobile racking, we see between **6-9 inches** between the wall and each rack, as well as between each row. However, if it's a stationary racking system, this spacing might not be sufficient for working with the racks and doing tasks. There's a balance between optimizing space and not using it effectively. **Mobility is key** for space optimization. Avoid maximizing space to the point where it harms plant health.

#3 What do you recommend the space between rows to be while in the **resting position**? When working with a **clean slate** what is optimal?

For best results, aim for at least 6 inches of space, but ideally **closer to 9 inches**. The width depends on how many rows of racking you have in the room. For instance, if you have 6 rows of racking compared to 24 rows, you shouldn't have the same width for the mobile aisle in both cases. Once you exceed a certain number of rows, you'll need to **widen the mobile aisle**. This isn't just for airflow but also for better workflow. You can place **ELEVATE® Platforms** between two rows with a wider mobile aisle, allowing two teams to start working simultaneously.

Introducing a competitive element can make tedious tasks more engaging and help speed things up. It's all about **finding the right balance** for your space. While 6 inches is the minimum, 9 inches is optimal. It really depends on the specific room dimensions and canopy size for each project to determine the perfect level of optimization, but we're here to help. Feel free to **share your design** with us for feedback.

#4 When building a **new grow facility**, what is the **ideal room height?**

There are a few things to consider when planning your setup...

HVAC Equipment Placement

Ideally, you want to keep mechanical equipment out of the cultivation room; it can reduce your effective ceiling height and be a vector for pests/pathogens. Think about the ceiling height compared to your grow room. Consider placing equipment above the grow room in a mezzanine, typically positioned above the main hallway.

Tier Consideration

If you're planning two or three tiers, it affects your decision-making. Think about what equipment will be in your room and what will be placed above. Ensure there's enough space for maintenance and service, as it can be challenging to fix systems if they're cramped.

Free Space

Instead of just focusing on height, think about how much free space you have above the racks (i.e. head space). It's recommended to have at least 3 feet of space. For example, if your room is around 12 feet high, the ideal ceiling height would be 16+ feet.

Use our free room generator tool to visualize your space in 3D! **TRY NOW**

#5 How can we best balance **irrigation strategy** with **environmental management**?

Great question, but a tough one to answer succinctly. We highly recommend you check out the book **"Plant Empowerment"** as this is a wonderful resource for learning how to balance all the cultivation parameters.

Irrigation strategy and environmental management are intrinsically linked via the process of transpiration, but **light** is still the main parameter **driving plant growth.** To begin dialing in this balance, consider the light levels you are providing your crop, then dial in the **root zone** accordingly using sensors and data collection to determine your VWC%, EC, pH, root zone temperature, and rate of dry back.

Based on this data and the rate at which your plants are drying back, **adjust your VPD** (leaf temp, air temp, and relative humidity) either up or down to increase or decrease the **rate of transpiration**. All of this needs to be adjusted based on the phase of growth, the age of the plant, and whether you are steering vegetatively or generatively. Every cultivation parameter must be in balance with the others for the plant and the room to operate at their **maximum potential.**

#6 What are the **biggest challenges** with labor and operating on a **multi-tiered system**?

Challenges or opportunities? Lean into the excitement! The biggest challenge may lie in **training individuals** accustomed to different systems and guiding them through adjustments. But new hires won't need to break old habits to adapt to new systems. The transition from single to multi-tier operations brings plenty of crossovers, simplifying the process. We've got the **tools and resources** ready for you to master operating systems safely. Once you're optimized, you'll have the freedom to move around and operate with ease.

#7 Is your company investing in the **German Cannabis Market**?

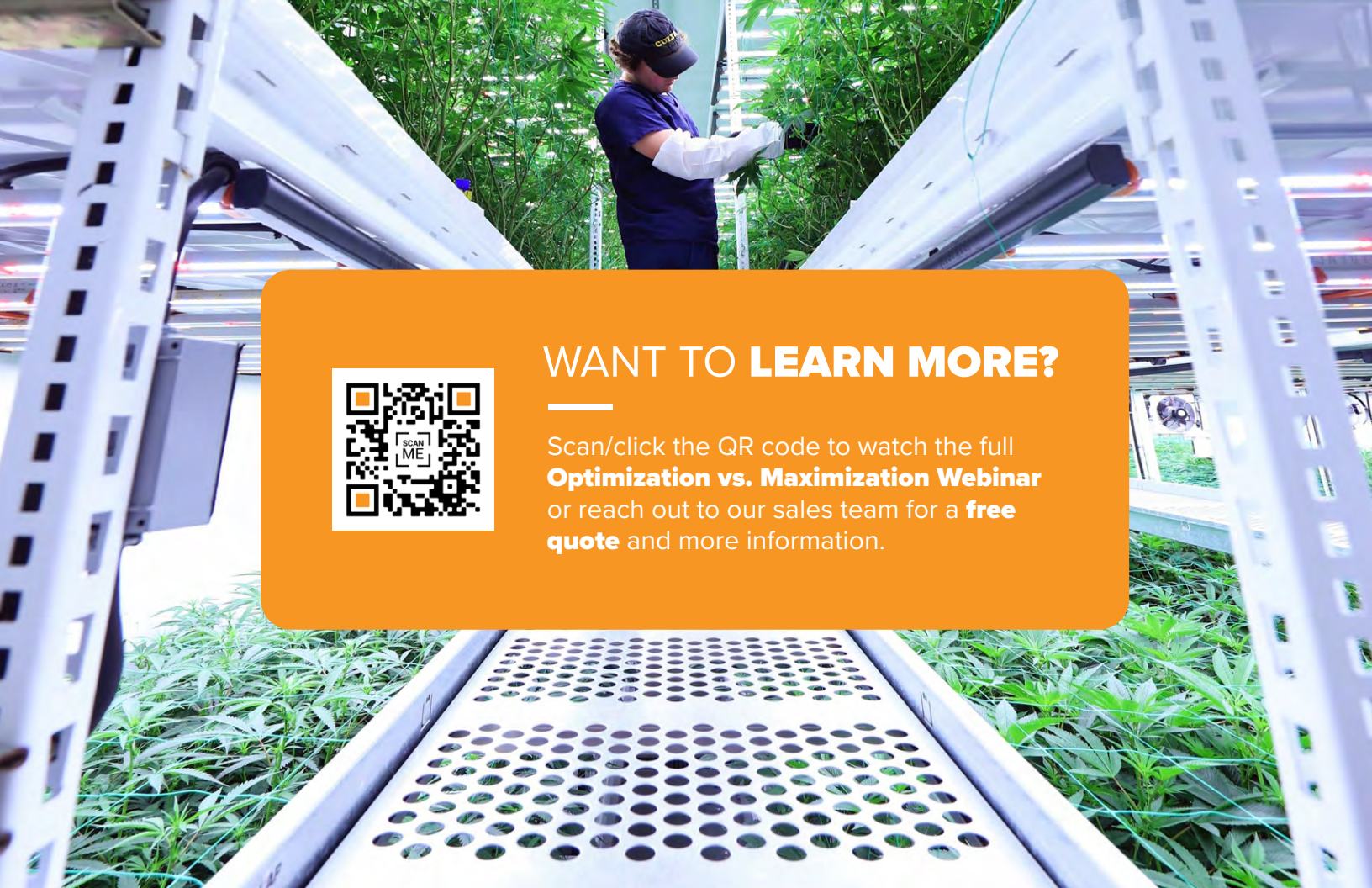
Pipp is actively working on investing in the whole EU and global market, including Portugal, where we have boots on the ground. We have **numerous global installations completed**, with several more in the pipeline.

#8 How closely are you working with **energy suppliers, utilities, and managers** when it comes to optimization; have you done a **cost-benefit analysis**?

We are in the beginning stage of this process. Pipp Horticulture is a member of the **Resource Innovation Institute**, a non-profit organization driving the adoption of resource efficiency and sustainability in the CEA and cannabis sectors. We have discussed with them the idea of doing a **cost-benefit analysis** comparing the efficiency of single-level to multi-level cultivation facilities. Stay tuned! Currently, we are working with utilities across the country to go after **utility rebates** for our highly efficient EC fan motors that are used in our **VAS 2.0 In-Rack Airflow System.**

#9 In a **retrofit room**, would you address attaining **proper tier row spacing** or **mechanical limitations**?

This is not an “or” situation, but more so an “and” situation. Both optimal row spacing and mechanical systems **need to be addressed.** When retrofitting from single-tier to multi-tier cultivation, the current HVAC and dehumidification will likely **not be sufficient.** It is critical to address electrical and climate control needs along with optimal racking layout and row spacing.



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Scan/click the QR code to watch the full **Optimization vs. Maximization Webinar** or reach out to our sales team for a **free quote** and more information.

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Contact **Pipp Horticulture's** experienced team of indoor cannabis operators and designers to take the first step towards your vertical farming future!

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