

# Indoor Farming:

Ensuring High Yield, High Quality Crops  
with Custom Dehumidification and Air Quality Systems



**THE DCA ADVANTAGE**

[DEHUMIDIFIERCORP.COM](http://DEHUMIDIFIERCORP.COM)

# INDOOR FARMING: ENSURING HIGH YIELD, HIGH QUALITY CROPS WITH CUSTOM DEHUMIDIFICATION AND AIR QUALITY SYSTEMS

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## GROWING CROPS FOR THE FUTURE

Professional farmers and botanists around the globe are beginning to take notice of the opportunities afforded by indoor farming. The ability to create and control perfect growing conditions offers tremendous opportunity for serious growers. These forms of indoor agriculture allow for the strict control of humidity, temperature, light, and watering levels, which reduce the inherent risk involved with traditional outdoor farming.

Indoor vegetable farms allow for creative growing setups that allow not only for environment and quality control, but also allow for more efficient use of space. The largest indoor farm in the world, located in Japan, can yield up to 10,000 heads of lettuce a day in 25,000 square feet- 100 times more per square foot than traditional methods. These farms can also carry stronger impact on environmental issues including soil erosion, water misuse and habitat loss in the future.





These same methods are also applicable to the United States cannabis market. With the shifting political regulation regarding marijuana consumption, the use of indoor growing space has become much more widespread and sophisticated. With legal and regulatory structure in place, it only makes sense that operations from supply chain to quality management controls would advance to keep up. Growers in this increasingly competitive arena need to make certain that they are capitalizing every dollar out of their investment to maximize return, which includes a hunt for the highest quality crops growing at maximum yields in any given space.

Both of these farming methods create a need for professional support and backing in maintaining conditions that will ensure maximum return on investment and eliminate the chance of any unplanned environmental changes to create losses in product or cash flow.

## CREATING IDEAL GROWING CONDITIONS

With a high quality indoor growing system, legally licensed commercial growers can create perfectly ideal growing conditions, improving both quality and yield of their crop. When growing crops for distribution, growers must be sure they are creating conditions that will produce the highest quality products that will satisfy customers and adhere to FDA guidelines. Responsible for protecting public health by assuring the safety of food and drug products, the FDA's standards must be strictly adhered to which presents growers all the more reason to strive for products grown in highly controlled spaces.

Lighting is probably the most well-known factor involved in indoor growing operations, as they feature heavily in media coverage of indoor grow operations, fictional and documentary alike. And while it is undeniably important – high pressure sodium (HPS), fluorescent, metal halide, or LED lamps are required to replicate the sun, an essential ingredient in plant growth, in an indoor grow setting – lighting is far from the only critical component.



# CLIMATE CONTROL

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As important to successful indoor growing operations as lighting, if not more so, is climate control.

In the case of indoor growing, climate control is a multifaceted challenge – far more fluid and complex than the usual “air on in the summer, heat on in the winter” method that most people are familiar with using in their homes.

These complexities are further compounded when expanding from a small-scale system to a larger-scale commercialized growing system. The same climate ranges that work for a crop of 10 plants doesn’t scale easily to a setup of 100 plants, which doesn’t scale easily to a setup of 1,000 plants.



## TEMPERATURE

Temperature is another important aspect of indoor growing, which requires a great deal of precision and delicacy.

The ideal temperature for marijuana cultivation generally ranges between 77° and 87° Fahrenheit (24° to 29° Celsius). This is a generalized average, however – more precise temperature ranges are dictated by a multitude of factors, including growing a particular strain of marijuana or type of vegetable, where you’re growing it, if you’re using specialty techniques like CO2 enrichment, and so on.

Further complicating temperature is the requirement to maintain distinct daytime and nighttime temperatures. This temperature difference is correlated with a plant’s internodal length, or the distance between secondary stems. In the case of cannabis, the greater the temperature difference, the larger the internodes; the smaller the temperature difference, the smaller the internodes. Small internodes lead to denser growth and higher yield plants.

## HUMIDITY

The humidity your plants are grown in is subject to the same variations as dictated by grow conditions.

Indica strains of cannabis, for example, tend to be from cooler, drier, higher altitude locations and consequently thrive in lower humidity. Sativa strains are generally from the tropics and prefer higher humidity. Hybrids' preferences vary greatly, depending largely on their proportion of indica and sativa DNA.



Generally speaking, you will want to maintain your indoor grow operation at a humidity level between 40 and 50 percent.

## CO2 LEVELS

As we all know, plants ingest CO2 as an energy source.

As the amount of energy a plant takes in directly correlates to its growth rates, it is important that CO2 levels are carefully monitored and controlled. Too little CO2 in the air and your plants will not grow or yield well. Too much and you risk them bolting – growing straight up in a single stalk at a fast rate of speed without branching off – which will also drastically reduce their yield.

Humidity fluctuation further complicates CO2 levels. Higher humidity levels can increase the metabolic rates of plants – even with a perfect CO2 level, excessively low or high humidity puts your crop at risk of undergrowth or bolting, respectively.

## AIR QUALITY MANAGEMENT

The overall quality of air in an indoor growing system is every bit as important as these other factors.

While indoor systems protect marijuana plants from wind and rain damage, it introduces new issues such as stagnant air. As an example, the best indoor grow systems include both intake and outtake fans, equipped with charcoal filters, to maintain negative air pressure.



## CGE AND INTEGRATION

The Closed Growing Environment (CGE) method of indoor cultivation is commonly considered to be the best method for commercial growers.

The CGE method allows for the creation of one or more fully controlled indoor microclimates, allowing growers to maximize plant health and growth at every stage. One of the primary tenets of the CGE method is sequestration.

Primarily, as much of the equipment – ballasts, electrical sockets, air conditioning and treatment equipment, and so on – as possible should be sequestered separately from growing spaces. Likewise, plants should be sequestered from each other based on their point in the growth cycle. Sequestering the equipment keeps unwanted heat and other stresses from the plants (not to mention simplifies maintenance access), and sequestering plants based on growth stage allows for growth stage-based microclimate control.

Due to the fully sealed nature of CGE growing, which often uses recirculated air, high quality filtration systems and CO<sub>2</sub> augmentation systems are often required. Air monitoring systems can be equipped with remote sensors for any number of variables, including temperature, humidity, and CO<sub>2</sub>.



## THE DCA SOLUTION

Nobody understands the importance of indoor air quality, including proper exhaust and ventilation, as well as Dehumidifier Corporation of America (DCA).

There are a tremendous amount of variables, many of them quite precise, that must be met and maintained to create an optimal indoor growing system. Doing so is a tall order, but not an impossible one. DCA can help you achieve the perfect indoor growing conditions for your commercial indoor operation.

Regardless of the size of the room, or the growth stage, each facility will have two different daily cycles - a daytime or lights on cycle and a night time or lights off cycle. Each cycle will have its own unique design conditions. A lights on cycle generally will use a higher space temperature to simulate daytime temperatures. Excess heat generated by the artificial lighting is controlled by a standard commercial air conditioning system. Typically, the a/c equipment has enough moisture removal capacity to control the space humidity.

However, the real moisture problems start during the night time cycle. With the lights off the demand for a/c falls. Without the air conditioning running there's no control over the moisture load. This is where the proper dehumidification system is critical and the dehumidifier system takes over. DCA understands these indoor climate control issues and concentrates on moisture control during the critical lights off cycle. Where other manufactures will try to provide complicated, expensive equipment to control the humidity and space temperature, DCA's main concern is with moisture removal during nighttime mode alone.

It's common for small or larger facilities to use portable, standalone dehumidifiers. Perhaps it's just one unit for a smaller room or multiple dehumidifiers for larger rooms. But sooner than later it becomes apparent that the small portable units are not an appropriate solution for professional growers. They either cannot properly control the moisture load or simply don't last long and frequently have to be replaced.

DCA has years of experience working with legal commercial growers on maximizing their climate control capabilities. We can design and install a system customized to meet your needs, and can integrate them completely and seamlessly into existing and new structures alike.



## GROWTH STAGES

Already complex, all of these factors are further complicated by the different stages of marijuana growth. To achieve maximum efficacy in each stage, they each require a different set of variables. The growth stages are as follows.



**SEEDS AND SEEDLINGS** – Marijuana seeds are available regular, a mix of male and female seeds ideal for their genetic range, or feminized, female-only seeds that grow the richly flowering plants that will be cultivated.



**CLONING** – also called sensimilla growing, cloning is the process of snipping new growth from an existing marijuana plant and allowing it to root on its own. This results in a second plant with the exact same DNA as the mother plant.



**TRANSPLANTING** – as they grow, marijuana plants need to be transplanted to larger vessels since growth slows or stops if the roots do not have enough space. Transplanting is a very delicate operation.



**VEGETATIVE CYCLE** – this is the period of primary growth, when a marijuana cultivar goes from a seedling to a nearly mature plant. Growth is generally between two to four feet over the course of three to six weeks.



**FLOWERING CYCLE** – the final growth stage, this is when the plants will flower. Unfertilized flowers are the product that is ultimately harvested.



**HARVEST** – when fully grown and matured buds are harvested.



**CURING** – when harvested buds are cleaned of extraneous leaves and stems, and cured and prepared for sale.



# ABOUT DEHUMIDIFIER CORPORATION (DCA)

Founded in 1995, Dehumidifier Corporation of America (DCA) is a US corporation dedicated to the field of dehumidification. This is a very specialized field best served by companies whose primary mission is that of solving every conceivable dehumidification challenge.

Dehumidifier Corporation of America takes pride in offering the best possible product line incorporating the latest proven technology at the most competitive prices in the industry. Our engineering staff is available to you at every step of the dehumidification process, from defining the problem, evaluating the moisture load, and matching the right dehumidification system to achieve the desired results.

Dehumidifier Corporation of America's mission is to solve our customer's dehumidification problems while offering the highest quality products at a competitive price, employing the latest proven technology and built to the highest standards by American craftsmen.

To learn more about DCA and our indoor air quality equipment and installation services, contact us today.



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