

Automatic Climate Control

The amount of control you will need to exercise over the environmental factors in your room will greatly depend on the scale of your growing area - the number of plants, the number of lights, the size of the room, and whether or not you are supplementing with CO₂. We assume you are looking for the best possible quality fruits / flowers and yield. If this is the case, you need to be aware of the environmental factors that will affect your plants' growth the most.

Air Circulation

The current of air that circulates in a grow room is as important as light, water, heat and nutrient. Proper ventilation acts as a mediator between light and water, removing excess heat and humidity, while providing plants with a healthy supply of CO₂. Probably the largest problems associated with growing indoors are ventilation or carbon dioxide related. Plants need CO₂ to grow and thrive. They absorb it and use light to break it down into carbon and oxygen. Carbon is used to create new plant material and oxygen is released as a byproduct. A lack of CO₂, found in musty grow rooms, encourages mold, invites algae and can turn plant leaves an hideous shade of yellow. This unhealthy environment eventually leads to stunted growth, withering and general plant malaise.

To provide ample CO₂ to plants, fresh air must be brought in continually, or it can be supplied via a CO₂ emitter or generator. Getting fresh air into your grow room can be as simple as an open hole with a screen, or a vent fan. (With CO₂ enrichment, a fresh air intake is not necessary.) The circulation within the room should be constant and breezy. Plants breathe through their stomata which reside on the undersides of their leaves. Air must ruffle these leaves, providing fresh CO₂ to their stomata. No stagnant air should be present.

In a closet or other small space, a small circulating fan should do the trick. For larger applications, an industrial fan should be positioned in such a manner as to facilitate a current of air which sweeps around the room in a circle. In a 10' x 10' space, one industrial fan combined with a wall mounted circulating fan should be sufficient. Larger spaces may need double or triple the amount of fans.

Temperature and Humidity Control

Growing plants produce humidity. Hot lights produce heat. You will need to control these factors. The easiest method of climate control is to install a vent fan on a timer. Proper venting takes at least one exhaust fan. Purchase a fan that will replace the volume (cubic feet) of air in your grow area in at least 2.5 minutes. (The shorter the time, the better. It is best to replace the air in less than 1 minute.) The stale air is replaced by fresh air drawn from another area or window. Keep in mind that humid air is heavier and more difficult to move; the BIGGER the fan the BETTER.

To calculate the room size multiply width by height to get the total cubic feet of your room. Here's an example: a 10' x 10' x 8' room is equal to 800 cubic feet. A vent fan should exchange the air within five minutes, so for an 800 cubic foot room you'll need at minimum a fan size which is capable of moving 160 cubic feet per minute. (We would suggest a 465 cfm for reasons explained above). The timer will regularly turn the vent fan on and exhaust hot and humid air. While this will help considerably it is still a very rough method of control.

At GreenCoast, we prefer a more precise form of control and therefore we use a vent fan powered by automated environmental controllers. For humidity we use the **EOS 1** which keeps the Total Humidity level within a set parameter through the use of a vent fan. If heat is your main concern, we suggest using a vent fan coupled together with either a **Zephyr1** from **Titan**. Air Cooling your lights is another possible solution. There are a variety of air cool reflectors available with 6 or 8" flanges. We prefer either the **Dominator** or **Yield Master**.

To dial in both your temperature & humidity control, we suggest Titan's digital and precise **Saturn 4**. This unique controller keeps both the humidity and temperature within a set parameter through the use of a vent fan. It can also be coupled together with a CO2 generator to create a dynamic combination. With this combination if either temperature or humidity get too high, the CO2 generator turns off and the vent fan turns on, until the appropriate environmental levels are returned. Then the CO2 generator turns back on and the vent fan goes off.

Let's discuss what high-tech automated environmental control can do for you. Using high-tech equipment in a growing environment will both boost plant growth exponentially and ensure the health of your plants. Light is the limiting factor in any indoor growing system. For this reason, all other variables (nutrients, carbon dioxide, pH, temperature, humidity, etc.) should be raised to optimum levels to compensate for any light deficiency. In an optimal environment, plants are able to absorb what they need, when they need it, resulting in accelerated growth and vibrant health. This translates into larger yields of fruit or flowers at harvest time. The average hand-watering home gardener realizes about a 150% increase in productivity after switching to a controlled hydroponic system. As your sophistication grows, you can experience a 250% or more increase from these beginning base harvest levels.

An automated system controls not only light and watering cycles, but maintains optimal nutrient, pH and CO2 levels at all times as well. The difference this makes for plant growth is like the difference between sitting in bumper to bumper rush hour traffic versus driving an open highway when every song on the radio is one your favorites. Plants grow a lot faster with every important environmental factor tuned in.

Automated controllers ARE expensive, but they really do make a large difference. They keep the conditions at the perfect level for your plants and they will reward you with gorgeous and beautiful produce. With each environmental factor that gets tuned in to the correct range, the plant growth becomes that much more healthy and robust. By its very nature, hydroponics works well with technology. And in order for nature to thrive in

an indoor environment, or in an environment that was up to now severely limiting --like a desert or a rooftop-- a slew of problematic factors must be solved. High-tech tools and methods are the dependable and essential solution.

You can achieve excellent results by using timers and innovation, however most commercial nurseries have automated controllers in their greenhouses. If you are growing plants for profit and want to compete on a commercial base, chances are you would benefit from some automated controls as well. We believe that you will want to start small, with a pH and Nutrient Meter, and then work your way up to humidity and temperature control using vent fans. After upgrading your air control, you will probably be most interested in either a Nutrient/pH water flow management system or CO₂. We have other info sheets detailing both of these categories.

So Is it worth it to put carbon dioxide in my garden?

Well, we actually deal with this on another info sheet in detail. But, in general we always say that you should dial all other variables in first before you try and deal with CO₂. It throws everything a little out of wack. You want your temperature to raise to around 84-86F (since this higher temperature is needed in order for your plants to metabolize all of this extra CO₂ and form it into sugars for the rest of the tissue it will generate,) and because of the fact that the plants are working much harder (and transpiring more water out of their leaves) humidity will rise as well. This opens a whole can of worms.

All this being said, CO₂ greatly enhances performance. Carbon Dioxide is a much needed resource for your plants' development and overall growth. Plants use CO₂ in their respiratory cycle, much like we depend on oxygen. Plants can absorb much more CO₂ than that which is available at natural atmospheric pressure levels. In most outdoor environments, CO₂ is available at 450 parts per million (ppm). Most plants can use anywhere from 1300 to 1600 ppm. This is roughly up to 4X the amount that is available outside. If you give your plants these elevated levels of CO₂, you will immediately notice

a vast increase in plant growth, development and fruit/production. Plants with elevated CO2 levels will produce, on average 30% more fruit/flowers when compared to plants at normal atmospheric CO2 levels. - That's a "true" easily attained 30% (as long as all the other environmental co-factors are dialed in as well. . .) Check out the Titan Controls for CO2. They make it oh so easy and are very affordable for what you get. The **Atlas 8** is a Fuzzy Logic CO2 Monitor and Control Unit that will keep your CO2 levels constantly at 1500ppms and is equipped with a photocell which turns the unit off at night when plants no longer take up CO2. The **Saturn 6** will do what the **Atlas 8** does (Fuzzy logic CO2 control) with added Humidity/ Temperature Control.