



The Perfect Room

Courtesy of Canadian Soiless

By going back to the sciences of optimum plant growth, we were able to create the perfect sealed growing oasis. The following directions are for a completely isolated room, which means there are no intake and no exhaust fans; the room is completely self-contained. For successful plant growth you will require the following principles:

HID Lighting

To get the maximum light to the growing surface for total photosynthesis, the recommended lighting is Bell Lighting Technologies' Lr1000 Light Reflector. On average these reflectors will distribute 95% of the total light produced down to the growing surface as compared to 50% produced from a standard parabolic or 70% produced by a Bat Wing Horizontal design. Total area covered by each reflector is approximately 4x5 feet. The reflector should be no closer than 30" above the growing plants so it is best to have the reflectors suspended with S hooks to chain- the four corners gathered in the center, leveled and attached to an eye bolt onto a pulley. This will allow you to adjust the height easily and quickly. As the complete cycle is only six weeks, 1000 Watt High Pressure Sodium ballasts and bulbs are best to use in this application.

Growing Medium

Although this plan is versatile and can be used with any medium in place, all tests were run in soil as it can be a lot more forgiving than hydroponic or aeroponic systems, which require high levels of monitoring. Two bales of sunshine #4 mix were placed in one (4x8) flood table. However, twenty (20) three gallon pots per light can be substituted if desired.

Irrigation

From manual wands to irrigational drip lines, it is entirely up to the grower, as long as the plants receive the right amount of nutrients daily and on a consistent time schedule. In any case, a reservoir will be required to mix the water, nutrients, 35% Hydrogen Peroxide and a pump to provide the pressure (gallons per hour) to get it through the hoses or drip lines.

Temperature Control

The ideal temperature to maintain in a growing chamber would be 78° to an absolute maximum of 86°. There are a couple of methods of cooling the space. Mechanical Air Conditioning is the most reliable and stable but it is costly and it uses electrical power (1Ton= 12 amps 5Ton=27 amps. Another method would be to use a heat Exchanger or a water coil with a fan box. The maximum (not necessarily needed) water flow that a 5 Ton Polar Bear Heat Exchanger uses per minute is up to 10 gallons and that can be pulled in from the tap, well, a river, lake, pond or even re-circulated from the water of a cool swimming pool or deep freeze. The water flow can be greatly reduced by adding a solenoid valve set up to a thermostat, having the temperature monitored and the unit to automatically come on when required. The Polar Bear Heat Exchanger is really an air conditioning coil that has been refitted. The little 1/8" pipes, that are standard for refrigerant or air conditioners, are refitted with 3/8" tubing to allow water flow to be unrestricted. Although it can use a lot of water, it does not use a lot of power. The only power required is enough to run the fan in box (a 2800 CFM Blower= 9.7amps). In either situations an 8" intake (from within the room) for the heat exchanger should be attached to the ceiling and an 8" exhaust (back into the room) should be at ground level. Quite often horizontal holes will be cut in the exhaust ducting to spread the cool air around.

Depending on room sizes the A/C or H/E can be centered and ducting can be T'd both for in and out exhaust. For the difference in pricing for the ducting we found the rigid sheet metal to be more effective at maintaining maximum airflow.

You will also need to have a water source in place for intake and a drain for output as well as a tray for the condensate valve. On average a 1000-watt light fixture will produce 4200 BTU, so in a 10 light growing chamber you will need to cool 42000 BTU. A one ton cooler (either an A/C Unit or H/E Unit) will cool 12000 BTU so $42000/12000=3.5$ Tons or a 4 Ton Cooler for 10 Light Chamber. When in doubt bigger is better when it comes to temperature control.

Carbon Dioxide (Co2)

Carbon Dioxide Enrichment will dramatically increase the growth of green plants. Photosynthesis occurs when green plants use CO₂, water (or nutrients) and light to synthesis organic compounds. The plant then converts these organic compounds into elements that it can use (food). It is absolutely imperative that these three main elements be in place as any area lacking will effect the desired results causing the plant to only perform as well as the ambient level that the CO₂, nutrient, or light will allow. Increasing the CO₂ in the growing chamber will allow the plant to use the excess water (nutrients) and energy that is stored in the leaves. The result is a substantial increase in the growth rate of any plant that uses chlorophyll in the process of photosynthesis. CO₂ generators (natural gas or propane) come in various sizes. In the Perfect Room, the CO₂ levels are introduced at 800 parts per million and will slowly be increased over the growing cycle to 1500 PPM. So it is necessary to have the unit large enough to maintain this level. Set up

to a solenoid valve and a timer, the CO2 enrichment should start when the lights come on and quit when the lights go off. The objective is to maintain a constant level in the atmosphere and therefore it is recommended that you use a CO2 sequencer to allow you to be able to set the desired PPM and a CO2 monitor/sensor to maintain the PPM. This will turn on the CO2 generator and off, maintaining the actual determined levels. Because CO2 generators are equipped with either a pilot light or glow plug to start them and do produce some heat when operating, we have allowed for the additional BTU's in the lighting formula, to accurately determine the size of cooling unit required. It is best that the CO2 generator hang from the ceiling a minimum of 18" and above the top of the reflectors. Wall mounted fans will help distribute the CO2 as well as mix the cool and warm air (please note that no air source should ever be blowing directly on to the plants).

Odor Removal

Some crops have a tendency to smell when they are in a flowering stage. If this is undesired we recommend the use of a charcoal unit. Because the room is sealed, the concern of having the odor being ducted outside is no longer a problem. However, inside of the building, the lingering odor needs to be dealt with. It is best to control it at the source. Virgin Coconut Charcoal is the most effective, eliminating 99.9% of the smell. Charcoal poses no threat to the plants well being and, in fact, it can aid in eliminating any air born viruses as well. Polar Bear Manufacturing has made a 5 ton heat exchanger that will allow you to add an ORS 2500 charcoal filter directly on top, saving valuable floor space. The unit has a total of seven layers of charcoal. There are two types of filters inside the unit, which aid in eliminating dirt, fungus and insects from the air. Near the top of the unit, there is a furnace filter and farther down through the unit there is a high efficiency filter, which will clean and finer particles out of the air, allowing the following five layers of charcoal to only eliminate the odor. The coconut charcoal is effective for at least ten months, provided that after each cycle you remix (resurface) the charcoal in a separate box and then pour it back into the trays. The furnace filter should be replaced after each cycle and the high efficiency filter should be replaced as required (approximately every three months). The ORS2500, which stacks directly on top of a 2800cfm fan in box, is capable of eliminating the smell generated by a thirty light production.

However, if you stack the charcoal unit on top of a heat exchanger, the airflow will be cut down, therefore it is only capable of handling a twelve light growing oasis.

Dehumidification

In the dark hours the plants are producing a lot of oxygen and therefore the air can become quite moist. For the most part in smaller rooms humidity is not a problem. However, when you are running 10 or more lights it is advised that a dehumidifier be running during the dark times to control the dampness.

Nutrients

There are plenty of varieties of nutrients available in the marketplace. We have found that the three part series are the most popular (regardless of the brand name), along with 35% hydrogen peroxide for aeration. A plant's needs change as the lifecycle continues. By using different nutrient combinations at vital stages of growth and maturity, the grower is able to control the final outcome of the crop.

Whenever a plant goes through a transplanting or a light pattern change occurs it might be necessary to add B-52 to your nutrient line up as you do not want to shock your plants. This could set your plants back a week or two and could effect the total outcome of the crop. Also, in a flowering stage we added Carbo Load from Advanced Nutrients. Carbo Load contains both simple and complexed carbohydrates that exactly matches a plant's carbohydrate profile. It was designed to boost the yield during the critical flowering stage when a plant would normally use up its carbohydrate reserve and stop producing; this nutrient additive continues the flowering process, resulting in larger fruit. It is extremely important at any stage to have your nutrient ppm equal that of your CO2 ppm. Starting off with your transplants at 800ppm and over the time increasing them to 1500ppm Last but not least you will want to flush your plants with water or a flushing agent, such as Advanced Nutrients' Final Phase for approximately a week. When a plant uses all of its stored nutrients, quality will be improved through better flavor and aroma. When flushing using a reservoir, it is important to use fresh water everyday.

Weekly Recommended Breakdown

- . Quantities are based on a 50 gallon resevoire. For nutrient measurements per gallon, refer to manufacturers label.
- . Light Cycle: five to seven days at 18hrs. of illumination per day. Remainder of cycle at 12hrs. of illumination per day.

Prior to your equipment set up, the room should be thoroughly cleaned and disinfected. Bug spray the entire room, including all corners and crevices. All cracks and joints should be mono-foamed. Black and white poly should be hung with all staple holes taped over and the bottom sealed with tuck tape. The entrance to the room should have a door that forms a seal when closed.

With all of these elements in place you are sure to have created a perfect sealed growing oasis resulting in consistently higher yields. Good Luck!

Article Source: [Maximum Yield](#)